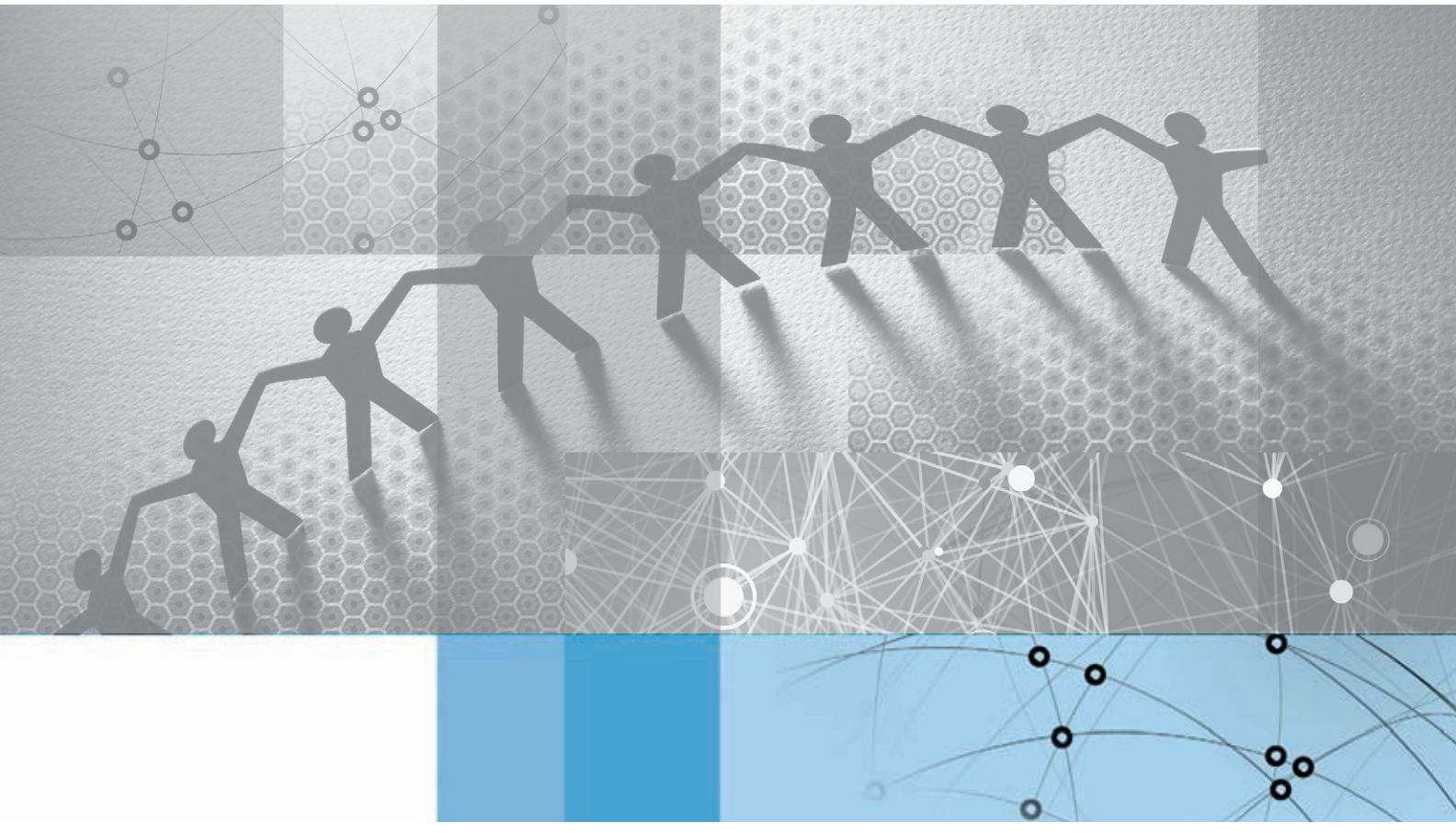
annual report 2012-13

IUSSTF

INDO-US SCIENCE AND TECHNOLOGY FORUM

Catalyzing Indo-US Science & Technology Cooperation

annual report 2012-13



INDO-US SCIENCE AND TECHNOLOGY FORUM

Catalyzing Indo-US Science & Technology Cooperation

The Indo-US Science and Technology Forum (IUSSTF), established under an agreement between the Governments of India and the United States of America, is an autonomous, not for profit society in India, co-funded and co-governed by both the governments. IUSSTF promotes and catalyzes Indo-US collaborations in science, technology, engineering, biomedical research and innovation through substantive interaction among government, academia and industry.

Contents

From the Executive Director's Desk

The Indo-US Science and Technology Forum (IUSSTF) has always been an organization on the move with a continuous effort at improving its processes and maintaining its relevance in the Indian and US science scenario by adding new programs to its programmatic portfolio. The fiscal year 2012-13 has been very engaging and a learning period for the IUSSTF. During this year, first batch of awards were announced under the two major programs launched last year.

In 2011, the IUSSTF was entrusted with the responsibilities of administering and implementing the Indo-US Joint Clean Energy Research and Development Centre (JCERDC). The JCERDC is a 5 year, USD 100 mn initiative in public private mode with Indian and US Governments each committing USD 5 mn every year and the industry providing matching funds. This program is funded and guided by the Indian Department of Science and Technology (DST) and the Department of

The joint review process involving a large number of experts was completed in 2012 and three consortia comprising of about 100 academic and industry partnering organizations were awarded projects in the area of solar energy, second generation of biofuels and building energy efficiency.

Biotechnology (DBT) and the US Department of Energy (DoE). The joint review process involving a large number of experts was completed in 2012 and three consortia comprising of about 100 academic and industry partnering organizations were awarded projects in the area of solar energy, second generation of biofuels and building energy efficiency. These efforts were lauded in the Indo-US Energy Dialogue held in Washington DC.

US-India Science and Technology Endowment Fund (USISTEF) is the other major initiative with a annual budget of about USD 2.5 mn. This initiative aims at fostering innovation and entrepreneurial ties between the US and the India teams for commercialization of science and technology led innovation for societal impact. This program is guided by the joint US-India Science and Technology Endowment Board and IUSSTF has been identified as the executive secretariat for implementing the identified programmatic activities. Under this program second & third calls for proposals were issued receiving in total 700 proposals. After a joint review and a diligence process, 3 bilateral teams were awarded projects in the broad categories of 'Empowering Citizens' and 'Healthy Individual,' in the second call and 19 proposals were shortlisted in the third call for next stage of detailed business plan submission.

It has always been an endeavor of IUSSTF to seed and catalyze new programs in line with common priorities of Indian and US Governments. During the US-India Joint Commission on Science and Technology Cooperation (JCM) held at Washington DC in June 2012 'Policy initiatives to strengthen bilateral research cooperation and best practices for retaining and advancing women in science and engineering' was an important theme of discussion. IUSSTF supported 'Women in Engineering', a major event held in Bangalore. and partnered

Technology commercialization is an important tool for transferring benefits of scientific research to the society. While IUSSTF has been supporting related workshops in bottom up approach, a new program 'Khorana Technology Transfer Course' was initiated with support of DBT and in partnership of the University of Wisconsin.

with DST and the US Embassy in organizing the annual 'Women in Science' symposium in New Delhi. More than 250 women scientists, engineers, researchers and policy makers participated in these event. Efforts are on to build upon this response in developing sustainable programmatic activities in this direction.

Technology commercialization is an important tool for transferring benefits of scientific research to the society. While IUSSTF has been supporting related workshops in bottom up approach, a new program 'Khorana Technology Transfer Course' was initiated with the support of DBT and in partnership with the University of Wisconsin. Another workshop on technology transfer in agriculture was supported at the Michigan State University.

The newly formed Science and Engineering Research Board (SERB), India launched 'SN Bose Scholar Program', during the IUSSTF Governing Board meeting held in January 2013 at IIT Bombay. This supports 3 months internships of up to 50 Indian Under Graduate students in US universities and up to 30 US Under Graduate students in Indian S&T institutions. IUSSTF has been entrusted with implementation of this program. Along with three other IUSSTF internship programs namely 'Khorana Scholar' program, Vitterbi-India program and RISE

(Research Internships in Science and Engineering), takes the number of slots available for internships to Indian and US UG, Masters and Ph.D. students to 150. This will make IUSSTF one of the major institutions facilitating a large number of students exchange visits between India and US.

A Memorandum of Understanding (MoU) was also signed between SERB/DST and the NIBIB/ NIH during the IUSSTF GB meeting. Under this MoU, both would work together for translational research on affordable and reliable measurement devices with commitment of USD 2 mn per year from each side for 5 years.

As part of regular networking activities, IUSSTF has supported 38 bilateral workshops and 4 training programs through calls for proposals during the period of this Annual Report. 4 new Joint Centres were also approved. Through these programmatic activities, exchange visits of about 600 Indian and support of US scientists an estimated new interactions of about 4000 to 5000 scientists will be facilitated.

A Memorandum of Understanding (MoU) was also inked between SERB/DST and the NIBIB/ NIH during the IUSSTF GB meeting. Under this MoU, both sides would work together for translational research on affordable and reliable measurement devices with commitment of USD 2 mn per year from each side for 5 years.

Back to Contents

History of Indo-US S&T Cooperation

1950's

Green revolution facilitated with the US PL 480 Rupee Funds

Establishment of Land Grant Colleges

1960's

Establishment of IIT, Kanpur

Establishment of NCERT, New Delhi

Nuclear Cooperation Agreement

Tarapur Power Plant

1970's

NASA-ISRO: Satellite Instructional Television Experiment (SITE)

Indo-US S&T Subcommission

1980's

Science & Technology Initiative (STI)

US-India Fund (USIF)

1990's

Indo-US Fellowships Program

ICAR MoU

Indo-US Vaccine Action Program

DST-NSF Program

NASA/NOAA-ISRO/DST MoU

DBT/ICMR-NIH/CDC Health & Medical Sciences Program

2000's

Indo-US Science & Technology Forum (IUSSTF)

Indo-US Science & Technology Agreement

High Technology Cooperation Group (HTCG)

Indo-US Strategic Partnership

- ICT
- Agri Knowledge Initiative (AKI)
- Space Cooperation
- Clean Energy
- Safety & Security
- Health Sciences
- Education

Joint S&T Commission

NASA-ISRO Agreement / MOES-NOAA Agreement

Indo-US Nuclear Agreement

Indo-US S&T Endowment Fund for Innovation

Joint Clean Energy Research and Development Center (JCERDC)

Back to Contents

Structure of IUSSTF

Management

The IUSSTF functions as

- Autonomous
- Bilateral
- Not-for-profit society

To ensure that the activities undertaken by the IUSSTF conform to the highest standards of excellence, a joint Governing Body consisting of seven Indian and seven American Government members, eminent scientists and technologists provide leadership to IUSSTF.

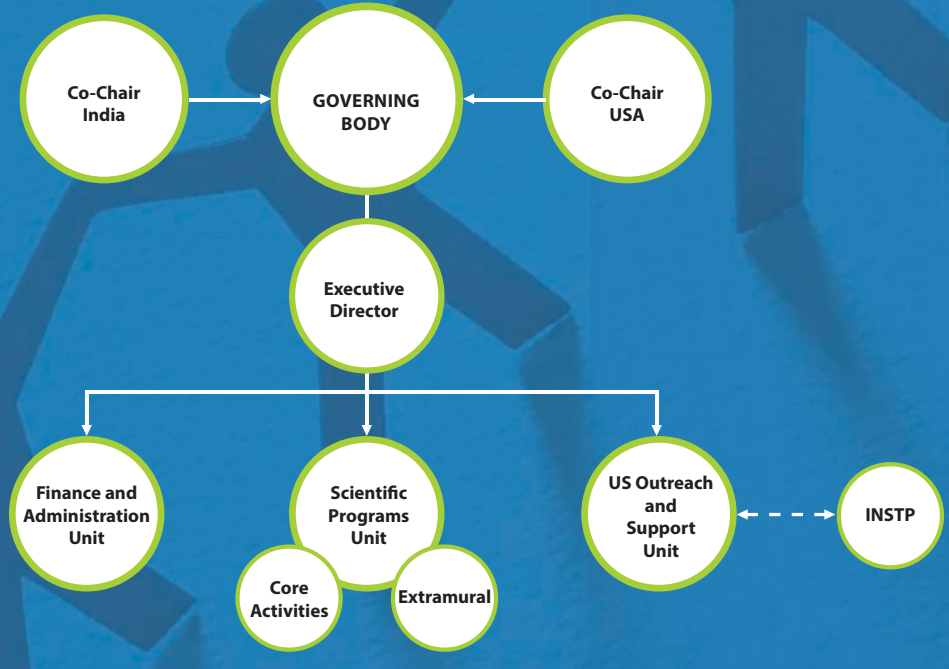
The Executive Director manages the IUSSTF affairs from its headquarters at the Fulbright House, New Delhi.

The India Science and Technology Partnership (INSTP) based out of the American Association for the Advancement of Science (AAAS) in Washington D.C. is the US provides outreach and proposals review support.

Funding

Annual interest earning from the endowment created by the US Government with matching contribution from Government of India through the Department of Science and Technology provides regular funds to administer the IUSSTF programs.

IUSSTF also has the freedom to receive grants, gifts, donations or other contributions from industries, foundations and private benefactors. Contributions to IUSSTF are tax-exempted under Section 80G of the Indian IT Act. Toward furtherance of its objectives, the IUSSTF welcomes fund contributions both in India and USA.



Back to Contents

Composition of the Governing Body

INDIAN CO-CHAIR

T. Ramasami
Secretary
Department of Science and Technology
Government of India

US CO-CHAIR

Norman P. Neureiter
Senior Advisor
Center for Science, Technology and Security Policy
American Association for the Advancement of Science

INDIAN MEMBERS

K. VijayRaghavan
Secretary
Department of Biotechnology
Government of India

Samir K. Brahmachari
Director General
Council of Scientific & Industrial Research and Secretary, DSIR

Indranil Manna
Director
Indian Institute of Technology
Kanpur

Vikram S Kirloskar
Vice Chairman
Toyota Kirloskar Motors

Vijay Chandru
Chairman & CEO
Strand Life Sciences

Anuradha Mitra
Joint Secretary and Financial Advisor
Department of Science and Technology
Government of India

US MEMBERS

Michael Clegg
Foreign Secretary
National Academy of Sciences

Subra Suresh
Director
The National Science Foundation

Roderic Pettigrew
Director
National Institute of Biomedical Imaging and Engineering

Phyllis G. Yoshida
Deputy Assistant Secretary
US Department of Energy

Ray O. Johnson
Senior Vice President and Chief Technology Officer
Lockheed Martin Corporation

Leo M. Chalupa
Vice President for Research
George Washington University

Objectives of IUSSTF

Catalyst to facilitate, seed and promote US-India bilateral collaboration in science, technology, engineering & biomedical research and innovation through substantive interaction among academia, R&D laboratories, industry and government.

- Support an exciting and enabling science and technology program portfolio that paves the way for sustainable interactions and potential collaborations through networking.
- Promote and strengthen strategic partnerships in science and technology under various intergovernmental initiatives and declarations.
- Create awareness through exchange and dissemination of information and opportunities toward promoting bilateral scientific and technological cooperation.
- Encourage public-private partnerships and technopreneurship to foster elements of innovation and enterprise through knowledge networking between academia and industry.
- Capitalize on the scientific and technological synergy on issues of common concern leading to long-term partnership based on shared values.
- Explore new frontiers by nurturing contacts between young and mid-career scientists and technologists to develop mutual trust, leadership and fraternity in research and development.

Back to Contents

Salient Outcome of IUSSTF Activities over the years...

"Success of IUSSTF in achieving its mandated activities should be considered as an exemplar and perhaps a benchmark for similar initiatives of S&T grant making bodies."
- NISTADS Report 2007

IUSSTF convened activities have led to the interaction of over 12,000 US and Indian scientists and technologists creating new opportunities paving way to sustained collaborations in diverse areas of science, technology and innovation.

Inter-Institutional Agreements

IUSSTF convened events have led to collaborations through inter-institutional agreements in diverse areas like weather and climate studies (National Center for Medium Range Weather Forecast, National Center for Atmospheric Research, India Meteorological Department & National Center for Environmental Prediction); advanced computing (Center for Development of Advanced Computing & Louisiana State University); Ayurvedic research (Department of Indian Systems of Medicine and Homeopathy & National Center for Complementary and Alternative Medicine); information sciences (Mysore University & University of Pittsburgh); ecoinformatics (Ashoka Trust for Research in Environment and Ecology & University of Massachusetts); technology management internship (Technology Information Forecasting Assessment Council & National Institute of Health); Sastra Ramanujan Awards (SASTRA University & American Mathematical Society); biomedical engineering (Shree Chitra Institute of Medical Science and Technology & Penn State University); water management (Jawaharlal Nehru Technical University and University of Colorado, Boulder); air traffic management (IIT-Bombay, National Aerospace Laboratories and NASA); conservation research (JNV University and University of Arizona); optoelectronic materials and devices (Society for Applied Micro-wave Electronics Engineering and Research, Tata Institute of Fundamental Research and University of New Mexico); post-harvest technology (Amity University and World Food Logistics Organization for a project funded by the Bill & Melinda Gates Foundation); mathematical proteomics (University of Hyderabad and University of Minnesota); the Unique Identification Number Project (IIIT Delhi & SUNY at Buffalo); protecting senior citizens from cyber security attacks in the e-health scenario (Amrita University, IIIT Delhi & SUNY at Buffalo); cloud computing and security (Amrita University, IIIT Delhi, IIT Bhubaneswar, IIIT Allahabad, SUNY at Buffalo, Arizona State University & Kennesaw State University); state-of the art research and knowledge center for cardiovascular diseases (Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram and Oklahoma Medical Research Foundation); ecological health of rivers (Indian Statistical Institute, Kolkata and University of Illinois at Urbana Champaign); self-assembled fibrillar gels (University of Nevada-Las Vegas and JNCASR, Bangalore; IACS, Kolkata and University of Maryland; Vidyasagar University, Medinipur and Georgetown University; IIT Kharagpur and Georgetown University; and, James Madison University and Indian Institute of Science, Bangalore); new functional materials: synthesis, properties and methods (an MoU was signed between Rowan University and Jamia Milia University with reference to teaching and joint programs. One post–doctoral position at Rowan University has been created in materials under the

aegis of this MoU); Biofuels: research challenges in the areas of combustion and fuel injection (the following collaborative joint projects were identified as a result of this workshop - Combustion instability and diagnostics of biofuels; Spray: atomization and vaporization; Droplet combustion; Chemical Kinetics; Fundamental flame studies; Pollutant measurement and control including novel strategies like nanoadditives; and, Biofuel production and supply); biocomputing (a major outcome of the workshop is the International center of excellence on Biocomputing which has been set up at NIT Calicut which is organized jointly by the Department of Computer Science & Engineering and School of Biotechnology, NIT Calicut and School of Informatics, Indiana University-Purdue University Indianapolis IUPUI, USA).

Indo-US Networking and Joint R&D Projects

IUSSTF has supported 233 bilateral workshops that have had a substantive impact in generating new joint R&D projects in areas of mutual interest like agricultural biotechnology (functional genomics); traditional medicines; nanoparticle aerosol S&T; high performance computing; tissue engineering; advanced manufacturing; brain research; infectious diseases; epidemiology and environmental health; seismic studies; geological carbon dioxide sequestration; hydrogen storage materials; futuristic manufacturing; fuel cells; target detection from remotely sensed images; structures in nano-biosystems; coastal water resource management; ceramic-based biomaterials; molecular insights in digestive diseases (Christian Medical College and Tufts University School of Medicine received five NIH grants for the period 2007-2013); and, public health in India (Christian Medical College and Yale University received two NIH and one Bill and Melinda Gates Foundation funded grant for the period 2009-2015).

To enable Indian and American scientists from academia and laboratories to carry out joint research activities by leveraging already existing infrastructure, 39 **Indo-US Networked Joint Centers** have been initiated. The Joint Center (JC) on *Nanomaterials for energy* has received additional funding from Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development and Defense Advanced Research Projects Agency; JC on *Climate Change and its impact on the ecosystem of the Arabian Sea* has received additional funding from NASA, NSF, and Space Application Centre; JC on *Biomaterials for Healthcare* has since been awarded 5 research projects by DRDO, DST and DBT in addition to the signing of an inter-institutional MoU between IIT-Kanpur and the University of Texas at San Antonio.

Considering the outcome and achievements of the Joint Centre on *Advanced Manufacturing* (under which one patent has been filed and the further research funding was received from agencies such as NSF and DST), IUSSTF awarded the partnering institutions the **Indo-US Centre for Research Excellence in Science and Engineering (CRESE)** on *Fabrionics* in order to consolidate and continue the collaboration by intensifying academic cooperation with the active involvement of industry and entrepreneurs required to translate the R&D outcome. This CRESE has received additional funding from DST and CSIR. Also, two patents have been filed and several joint publications have been generated. Other Centers for Research Excellence in Science and Engineering established include: *Advanced Materials Research* (Partners: Jawaharlal Nehru Centre for Advanced Scientific Research, Northwestern University, Indian Institute of Science and Argonne National Laboratory); *Nanobiotechnology* (Partners: National Center for Biological Sciences, Harvard Medical School, Jawaharlal Nehru Centre for Advanced Scientific Research and Centre for Cellular and Molecular

Biology); and, *Nanomaterials for Energy* (Jawaharlal Nehru Centre for Advanced Scientific Research, Purdue University and GE India Technology Centre Bangalore).

Educational Programs

By supporting over 40 Training Programs/Advanced Schools, IUSSTF has seeded the development of educational programs such as in

- nutritional epidemiology (Public Health Foundation of India, New Delhi and Emory University, Atlanta)
- immunology (International Centre for Genetic Engineering and Biotechnology, New Delhi and Harvard Medical School, Boston)
- information management sciences (Mysore University & University of Pittsburgh)
- green chemistry (Delhi University & Green Chemistry Institute)
- advanced manufacturing (IIT, Kanpur & Northwestern University)
- nanotechnology (SASTRA & University of Arkansas)
- microsurgery (All India Institute of Medical Sciences & US Association of Microsurgery)
- distance education in engineering (Amrita University/ISRO & 21 US partner university and institutions)
- number theory (Sastra University & University of Florida)
- museum science communication (National Council for Science Museums, BITS, Pilani & Smithsonian Institution)
- ASEE led Indo-US collaboration for engineering education
- discrete mathematical chemistry (Osmania University and University of Minnesota)
- Hurricane Weather Research and Forecasting (IIT-Delhi and National Oceanic and Atmospheric Administration). The IUSSTF supported University of California Berkeley-IIT Kharagpur collaboration on energy research has catalyzed the establishment of the *PK Sinha Center for Bioenergy* at IIT-Kharagpur with a gift of $2 million from an IIT-Kharagpur alum. The Center is now well positioned to strengthen and accelerate bioenergy research between IIT Kharagpur and US Berkeley.

Major Initiatives

Some of the major initiatives catalyzed by IUSSTF includes the Indo-US civilian space cooperation

- University of California-India R&D Initiative
- Indo-US distance education program in engineering; Aircraft borne tropical cyclone prediction system
- Biogeochemical flux monitoring network - IndoFlux
- Translational Health Science and Technology Institute, India – THSTI
- India's joining the US led International Partnership in Hydrogen Economy (IPHE) and the US DOE Blue Sky Carbon Sequestration Program facilitated the inclusion of knowledge-based R&D (nano, info and biotechnology) as a part of the Indo-US High Technology Cooperation Group (HTCG) dialogue.

IUSSTF maintains a close working relationship with the federal agencies, laboratories, government institutions, and the academia in US and India, cutting across all disciplines. In 2011, IUSSTF has been entrusted to administer the bi-national **US-India Science & Technology Endowment Fund and the Indo-US Joint Clean Energy Research and Development Center (JCERDC)**.

The aim of the Endowment Fund is to strengthen and expand S&T cooperation for public good through science and technology R&D entrepreneurial

activities intended to lead to the commercialization of technology that will develop sustained partnerships between US and Indian scientists and entrepreneurs for the mutual benefit of both countries. The two priority areas identified are *'Healthy Individual'* and *'Empowering Citizens'*. Under the second call of the Endowment Program, the following three projects were selected for award.

- *Mobile phone based HbA1c analyser* (the novel platform comprises of two components- a colorimetric test strip for HbA1c and a software application that uses the phone's camera to analyze the test strip. Additionally, the software application can provide automated decision support and transmit data to remote specialists, thus enabling millions of field health workers to screen and manage diabetes in even the most remote communities.)
- *A novel way to manage fecal incontinence in non-ambulatory patients* (the team has developed a self-expanding device to manage fecal incontinence in non-ambulatory patients with a unique placement, deployment and withdrawal mechanism. The device requires minimal training and can be administered without the need for imaging and works on all patients, irrespective of their stool type or sphincter tone. The product offers a hygienic insertion mechanism and is overall very sanitary and patient friendly.)
- *Branchless banking and financial services for the unbanked and under-banked* (building a low-cost payment infrastructure for instant small value financial transactions by leveraging existing retail shops, tele-connectivity and banking infrastructure to extend branchless banking services to the common man. The project aims to deliver financial services efficiently and at scale through smart phone based application mechanism integrating with the Unique Identity UID).

The JCERDC is a joint initiative of the Government of India and the US Department of Energy with the overall aim being to facilitate joint research and development on clean energy by teams of scientists, technologists and engineers from India and the United States, and related joint activities, needed to deploy clean energy technologies rapidly with the greatest impact. To achieve this objective, the Indo-US JCERDC will support multi-institutional network projects using public-private partnership model of funding. The priority areas are *Solar Energy, Second Generation Biofuels and Energy Efficiency of Buildings.* After completing the compliance review of the proposals received, a total of 19 proposals were accepted for further evaluation. After an intensive multi-level review and evaluation process, three consortia (one each in the three priority areas: Solar Energy, Second Generation Biofuels and Energy Efficiency of Buildings) were selected for award in April 2012. This first-of-its-kind initiative has brought together more than 90 institutional partners to work jointly in the space of clean energy research. This program is currently in its second year of implementation. The fund commitment towards this effort by each Government is $5 million per year for five years.

Road maps of cooperation

Road maps and contours of Indo-US cooperation were chartered through IUSSTF convened events on civilian space cooperation (ISRO & NASA); microlight air vehicle development (National Aeronautical Laboratory & University of Maryland); primate national action plan (Primate Research Council & US Wildlife and Fisheries Agency); Indo-f ux program (DOES); linear collider for high energy physics (DST & DOE labs); technopreneurship in academia (National Entrepreneurship Board); GLP on medical devices. In 2008, IUSSTF had supported an Indo-US workshop on *low-cost diagnostic and therapeutic medical technologies*.

Back to Contents

As a result of this workshop, the National Institute of Biomedical Imaging and Bioengineering (NIBIB) and Department of Biotechnology (DBT), Govt. of India, are initiating jointly funded initiatives that capitalize on the expertise and resources of the two nations. On June 24th 2010, at the US-India Science and Technology Joint Commission Meeting in Washington, D.C., NIBIB and DBT announced the availability of supplemental funding for eligible NIBIB-supported research grants to facilitate collaborative work among researchers in the US and India. The grants will be used to develop low-cost diagnostic and therapeutic medical technologies that can be used in underserved communities worldwide.

Hypertension diagnosis and management is a critical healthcare issue. However, the basic underlying approach for the measurement of Blood Pressure has essentially remained the same for the past several decades. This is an obvious area that is ripe for disruptive technological innovation. The purpose of the *Indo-US Grand Challenge Initiative on Affordable Blood Pressure Measurement Technologies for Low-Resource Settings in India and the US between the Science & Engineering Research Board* (SERB), Department of Science & Technology, Government of India and the National Institute of Biomedical Imaging and Bioengineering (NIBIB, NIH), USA is to encourage collaborative research within and between both the countries to propose new approaches to the measurement of Blood Pressure that are unobtrusive or passive, low cost and which can automatically provide frequent data recording and reporting to healthcare workers as well as feed back to the patients. SERB and NIBIB are launching two separate and parallel, but fully coordinated, funding opportunity announcements in India and USA respectively to promote research in this area and generate alternate scientific approaches and technological options. It is expected that this partnership between the two countries will leverage knowledge and material resources to develop new technologies which are relevant for low resource settings not only in their respective political domain but other similar settings all over the world.

Indo-American Frontiers of Science (FOS) & Frontiers of Engineering (FOE)

IUSSTF has also initiated the *Indo-American Frontiers of Science (FOS) and Frontiers of Engineering (FOE)* symposium in partnership with the US National Academy of Sciences and National Academy of Engineering. This has provided a unique platform to the best and brightest young minds from India and US to interact and discuss cutting edge scientific pursuits. The series has helped to establish trans-disciplinary research activities and build contacts between the next generation scientists through IUSSTF seed awards. As a spin-off, the annual national frontiers meeting in India has been initiated by the Indian Academies.

Industry supported activities

IUSSTF has promoted techno-entrepreneurship through the *DST-Lockheed Martin Innovation Growth Program* in partnership with UT-Austin, FICCI and IUSSTF has led to the signing of 69 business deals worth Rs. 200 crores/$ 43m; *Stanford-India Biodesign program* in partnership with IUSSTF has generated eight prototypes of biomedical devises for commercialization; and the *DST-Intel India Innovation Pioneers Challenge* in partnership with IUSSTF have showcased several student led innovation which have won international awards and have commercialization potential. IUSSTF also partners with IBM to conduct the *IBM-IUSSTF Visiting Fellowships in Nanotechnology*. IUSSTF also supported the *Young Engineers Visitation Program* in partnership with Lockheed Martin Corporation. Several industry funded projects in academia were initiated following IUSSTF seeded activities in areas like cyber security; microwave

technology; RFID and wireless sensors; design engineering; nano-coatings; rapid prototyping; nanofabrication for solar cells; lithium-ion based Nan batteries (joint Indo-US business venture); telecom switching; design of aerospace alloys, as examples of academia-industry partnerships.

S&T capacity building

Addressing the need for human S&T capacity building, IUSSTF has instituted the *Indo-US Research Fellowship* in partnership with DST. Reciprocal student exchange programs aimed to groom and connect the next generation of scientists have been launched, which includes the *Research Internships in Science and Engineering for PhD students; Viterbi-India Program* (with the University of Southern California); *UC Berkeley–IIT Kharagpur exchange program; MIT-IUSSTF internship program; Experimental Learning in International Agriculture exchange program* (Cornell Univ. and 4 Indian State Agriculture Universities); *Visitation programs* with the American Physical Society and the American Society for Microbiology. It is also heartening to note the success of the *Khorana Program for Scholars* (in partnership with DBT and the University of Wisconsin-Madison). Keeping in view the success of the program, DBT approved both the extension and the expansion of the program to allow more students and more US Universities to be part of this program. In 2012, 30 Indian students were placed across 9 mid-western US Universities (University of Iowa, University of Illinois, University of Michigan, University of Minnesota, Michigan State University, Indiana University, Georgetown University, MIT and University of Wisconsin-Madison). Expansion to other leading US Universities is also envisioned as the program moves forward. Although in principle agreed upon in 2009; *the Technology-transfer course* (in partnership with DBT and the University of Wisconsin-Madison) came into being in 2012. This course has been specially designed as an intensive program aimed to provide participants with significant insight into managing technology in its journey from the laboratory to the marketplace.

The Science and Engineering Research Board, Department of Science and Technology (DST), Govt. of India, the Indo-US Science and Technology Forum (IUSSTF) and the University of Wisconsin-Madison (UW) have partnered to launch a dynamic and transformative student exchange program between premier institutions in India and the United States. The program is named in honor of Satyendra Nath Bose (1894 – 1974), a visionary Indian physicist best known for his work on quantum mechanics in the early 1920s. The *S.N. Bose Scholars Program* provides an opportunity to Indian and US students (enrolled in Bachelors and Masters programs in Atmospheric and Earth Sciences; Chemical Sciences; Engineering Sciences; Mathematical and Computational Sciences; and, Physical Sciences.) to undertake a research internship each summer in each other's countries. It has been unambiguously demonstrated that providing students with an exposure to cutting edge scientific research experience at a formative stage not only broadens their intellectual horizons but also leads to increased engagement in scientific and technological research careers. An added benefit is that an exchange program also enables the creation of sustainable and vibrant linkages between the two nations, as well as building deep-rooted long-term Indo-American science and technology relationships.

14th Governing Body Meeting

The 14th meeting of the Governing Board of the Indo-US Science and Technology Forum (IUSSTF) took place under the Co-Chairmanship of Dr. T. Ramasami, Secretary, Department of Science & Technology (DST) Govt. of India (Indian Co-Chair) and Dr. Norman P. Neureiter, Advisor, American Association for the Advancement of Science (US Co-Chair), on 19 January 2013 at the Indian Institute of Technology-Powai Campus in Mumbai, India. Dr. William Colglazier, Science and Technology Adviser to the Secretary of State also attended the meeting as special invitee.

As it has always been the endeavor of IUSSTF to catalyze, promote and support networking activities in areas of importance to the US and India; in order to showcase these activities and view their outcomes, Dr. Rajiv Sharma (Executive Director, IUSSTF) introduced to the Board a comprehensive compendium of all Workshops, Training Programs and Virtual Networked Centers supported by the Forum. This document aimed to showcase the strength and value of such networked partnerships enabled through IUSSTF support.

Back to Contents

The Governing Board members deliberated and provided their views on the accomplishments and also the future vision and role for IUSSTF in promoting its mandate. Dr. Ramasami lauded IUSSTF's role as a catalyst in deepening and broadening the scientific and technological collaborations between India and the United States. He was also appreciative of the manner in which IUSSTF is administering the Indo-US Joint Clean Energy Research and Development program for the Govt. of India and the US Department of Energy. He also lauded the visitation programs administered by IUSSTF and described them as "nation building exercises". Dr. Neureiter expressed his happiness over the accomplishments of IUSSTF and felt that the time had come to think broadly and deeply about the future vision and path for the Forum. At the end of the meeting, Dr. Hari Gopal (Science and Engineering Research Board-SERB, DST, Govt. of India) announced the *S.N. Bose Scholars Program* supported by SERB in partnership with

IUSSTF and the University of Wisconsin-Madison (UW). This dynamic and transformative student exchange program between premier institutions in India and the United States is named in honor of Satyendra Nath Bose (1894 – 1974), a visionary Indian physicist best known for his work on quantum mechanics in the early 1920s.

Program Portfolio

IUSSTF promotes Indo-US Science and Technology partnerships by responding to the needs of its stakeholders in adopting a dynamic program portfolio largely conceived and driven by the scientific communities of both nations.

- Symposia, Workshops, Conferences on topical and thematic areas of interest
- Special initiatives on bilateral strategic partnerships
- Visitation program through fellowships and internships
- Industry – Academia connect programs
- Innovation programs to promote technoentrepreneurship
- Training programs and Advanced Schools towards human resource development
- Public-Private Networked Centers to foster pre-commercial R&D
- R&D Knowledge Networked Centers for promoting thematic research
- Centers of Research Excellence
- Travel Grants
- Flagship Initiatives for young scientists and technologists in partnership with US National Academies
  - Indo-American Frontiers of Science Symposium
  - Indo-American Frontiers of Engineering Symposium

Back to Contents

Annual Report
Indo-US Science & Technology Forum

Programmatic Activities

ANNUAL REPORT 2012-13

Back to Contents

FLAGSHIP PROGRAM

Fifth Indo-American Frontiers of Science Symposium

07-10 April 2013, Agra, India

Organizing Co-Chairs:
Kedar Damle
Tata Institute of Fundamental Research, Mumbai
E-mail: kedar@theory.tifr.res.in

Todd Oakley
University of California, Santa Barbara
E-mail: oakley@lifesci.ucsb.edu

The fifth **Indo-American Frontiers of Science (IAFOS) Symposium** was convened by the Indo-US Science and Technology Forum (IUSSTF) as its annual f agship event in partnership with the US National Academy of Sciences (NAS) from April 7th to 10th at Agra, India. The symposium brought together about 70 brilliant young scientists and technologists from Indian and US academia, laboratories and industry. At the symposium, attendees presented their talks as part of eight interdisciplinary sessions on contemporary research topics to colleagues outside their field with a view to both conveying and deriving cross-disciplinary information and insights through a format, which allows informed one-to-one discussions amongst the participants.

Session I: The acquisition of renewable, low-carbon forms of energy is perhaps the most important challenge facing mankind today. The introductory speaker in the session on *Materials for energy conversion and storage: Discovery through experimental and computational approaches* was *Don Seigel* (University of Michigan) who spoke on Materials for energy conversion and storage and what can be done to secure a sustainable energy future. *Jeff Sakamoto* (Michigan State University) delivered a talk on keeping up with the increasing demands for electrical energy storage and conversion.

Back to Contents

Aninda Bhattacharyya (Indian Institute of Science) spoke about materials for modern rechargeable batteries using Lithium-based battery as a case-study.

Session II: The lead speaker in the session on *Planet/star formation* was *Sujan Kumar Sengupta* (Indian Institute of Astrophysics) who spoke about more than 800 extra-solar planets that have revolutionized our understanding of planets and their formation. *Maheswar Gopinathan* (Aryabhatta Research Institute of Observational Sciences) delivered a talk on the Bok Globules that are identified as the sites of low mass star formation in the solar neighborhood. The origin of the earth and solar system is one of the longest-standing questions in science and *Andrew Youdin* (University of Colorado-Boulder) spoke about the birth of planets in the solar system and beyond.








Session III: The session on *Systems biology and medicine* began with a talk by *K.V. Venkatesh* (IIT-Bombay) who gave an overview of the field with system science principles in conjunction with experimental methodologies required to achieve a system level understanding of cellular behavior. *Raul Rabadan* (Columbia College of Physicians and Surgeons) delivered a talk on fast evolutionary processes by genome analysis of tumors and RNA viruses. *Anurag Agrawal* (CSIR-Institute of Genomics and Integrative Biology) spoke about how systems medicine is an exciting new frontier of science and translational applications of analytical concepts from systems biology to physiological or clinical data is rewarding.

Session IV: *Alison Pischedda* (University of California-Santa Barbara) delivered the introductory talk in the session titled *Battle of the sexes* and spoke about interactions between males and females being fundamental to the evolution of sexual mating systems. *Ryan Calsbeek* (Dartmouth University) spoke about the resolution of sexual conflict and N.G. Prasad (IISER-Mohali) talked about interlocus sexual conf ict and the evolution of life-histories.

Session V: In the session on Quasiparticles and semiconducting devices, the lead speaker Andrea Young (MIT) spoke about massless electrons and fractionally charged particles in graphene. *Mandar Deshmukh* (Tata Institute of Fundamental Research) presented the efforts to develop a simple technique for lateral nanowire wrap around gate devices with high capacitive coupling. *Jay Sau* (Harvard University) talked about topological quantum computation and the search for non-abelian majorana modes in solid-state systems.

Session VI: *Subha Majumdar* (Tata Institute of Fundamental Research) delivered the introductory talk in the session on *Dark matter/dark energy*. *Sudhir Vempati* (Institute Institute of Science) discussed particle physics models of dark matter. *Marcelle Soares-Santos* (Fermilab) presented an overview on

dark energy and discussed prospects for shedding light on this problem with current and upcoming methods.

Session VII: Graphs are one of the most ubiquitous models of both natural and human-made structures. *Prahladh Harsha* (Tata Institute of Fundamental Research) delivered the introductory talk of the session on *Graphs, randomness and computation* and surveyed the area of graph theory and its applications. *Nikhil Srivastava* (Microsoft Research) spoke about a recent line of work with Batson, Speilman and Teng which showed that every graph can be approximated by one which is very sparse. *David Liben-Nowell* (Carleton College) talked about some recent computational research that studies information propagation through the digital traces of online activity.

Session VIII: Mahesh Sankaran (Tata Institute of Fundamental Research) delivered the introductory talk in the session on *Ecological impacts of climate change*. He spoke about how human activities are transforming our planet and its climate in unprecedented ways and the fact that understanding the consequences of these changes represents one of the most pressing problems faced by ecologists today. *Sabin T.P*. (Indian Institute of Tropical Meteorology) talked about high-resolution regional climate downscaling. *Joshua Lawler* (University of Washington) spoke about projected future changes in climate and how they will likely result in shifts in f ora and fauna to track suitable conditions.

At the FOS, *Bruce Alberts* (Editor-in-Chief, Science 2008-2013, US Science Envoy 2009-2011 and President, US National Academy of Sciences 1992-2005) delivered a talk on *Science and the world's future* where he spoke about knowledge sharing and capacity building; and, connecting scientists to each other and to their local communities.

A unique dimension of the Indo-US FOS Symposium is the *Frontiers of Science (FOS) Awards* that have been instituted by IUSSTF and was announced by *Rajiv Sharma* (Executive Director, IUSSTF). The award consists of USD 10,000 to be shared between the partnering Indian and American awardees, spread over a period of two years.

Back to Contents

STRATEGIC PROGRAMS

Indo-US Joint Clean Energy Research and Development Center (JCERDC)

Contact Persons:
Ariadne BenAissa
US Department of Energy, Washington, DC
E-mail: ariadne.benaissa@hq.doe.gov

Nishritha Bopana
Indo-US S&T Forum, New Delhi
E-mail: nbopana@indousstf.org

Recognizing the need to address climate change, ensure mutual energy security, and build a clean energy economy that drives investment, job creation, and economic growth; Prime Minister Manmohan Singh and President Barack Obama launched the US-India Partnership to Advance Clean Energy (PACE) under the US-India Memorandum of Understanding to enhance cooperation on Energy Security, Energy Efficiency, Clean Energy and Climate Change. This MoU was signed on November 24, 2009 during Prime Minister Singh's visit to the United States. As a priority initiative under the PACE umbrella, the US Department of Energy (DOE) and the Government of India signed an agreement to establish the **Joint Clean Energy Research and Development Center (JCERDC)** on November 4, 2010 during President Obama's head of state visit to India. The JCERDC is designed to promote clean energy innovation by teams of scientists and engineers from India and the United States.

The overall aim of the JCERDC is to facilitate joint research and development on clean energy to improve energy access and promote low-carbon growth. To achieve this objective, the Indo-US JCERDC supports multi-institutional network projects using a public-private partnership model of funding. The JCERDC is funded by the Indian Ministry of Science and Technology and the US Department of Energy. The program is being administered in India by the *Indo-US Science and Technology Forum (IUSSTF)*. On the basis of a rigorous binational review and evaluation process, three consortia were selected for award. The awards were announced as a press-release by the Press Information Bureau on 16th April 2012.

A brief summary on the first-year progress of the projects awarded in the space of **Solar Energy, Building Energy Ef ciency and Second-Generation Biofuels** is as follows:

Solar Energy

The **Solar Energy Research Institute for India and the United States (SERIIUS)** is co-led by the Indian Institute of Science (IISc)-Bangalore and the National Renewable Energy Laboratory (NREL) and includes the following partners:

Collaborating Institutions, India	Collaborating Institutions, USA
Lead Institution: Indian Institute of Science, Bangalore	**Lead Institution:** National Renewable Energy Laboratory
Other Academic Partners: 1. Indian Institute of Technology, Bombay 2. Indian Association for the Cultivation of Science, Kolkata 3. ARCI, Hyderabad 4. Solar Energy Center, Gurgaon 5. Indian Institute of Technology, Madras 6. CSTEP, Bangalore	**Other Academic Partners:** 1. Lawrence Berkeley National Laboratory 2. Arizona State University 3. Carnegie Mellon University 4. Colorado School of Mines 5. Massachusetts Institute of Technology 6. Purdue University 7. Stanford University 8. University of Central Florida 9. University of South Florida 10. Washington University

Collaborating Institutions, India	Collaborating Institutions, USA
Other Industry Partners: 1. Thermax Ltd 2. Clique Developments Ltd 3. Hindustan Petroleum Corporation Ltd. 4. Moser Baer India Ltd 5. TurboTech Precision Engineering Ltd 6. Wipro Ltd	**Other Industry Partners:** 1. RAND Corporation 2. Corning Incorporated 3. General Electric Company 4. MEMC Corporation 5. Solarmer Energy Inc. 6. Cookson Electronics

The JCERDC grant was awarded to SERIIUS on 22 November 2012. The Total JCERDC Grant-in-aid for Indian component or the SERIIUS project (over 5 years) is Rs. 50,07,52,800/- with a first year release of Rs. 1505.722 Lakhs.

SERIIUS carries out fundamental and applied research, analysis and assessment, outreach, and workforce development through specific bi-national projects in three Research Thrusts - Sustainable Photovoltaics (PV), Multiscale Concentrated Solar Power (CSP), and Solar Energy Integration (SEI). The vision is to ready these solar electricity technologies toward the long-term success of India's Jawaharlal Nehru National Solar Energy Mission and the US Department of Energy (DOE) SunShot Initiative.

The highlights of the first year include the following:

- SERIIUS was officially launched with a special event in Washington, DC, hosted by the US Secretary of Energy and the Government of India at the US-India Clean Energy Dialogue (September 28, 2012) and at a kickoff with the Government of India in Mumbai (December 8, 2012).
- Consortium research projects were initiated (starting January 2013), following the SERIIUS 10-Point Work Plan, developed through an all-SERIIUS consensus process for the Sustainable PV, Multiscale CSP, and SEI Research Thrusts. Administratively, the funding is now with the partner organizations, and there is an agreement on Intellectual Property
- Management Plan (IPMP) and Intra-Consortium Non-Disclosure Agreement (NDA) finalized.
- SERIIUS Fellowship and Scholar Program were inaugurated (February 2013).
- SERIIUS Web Gateway (www.SERIIUS.org) is in initial full operation, providing information about the Consortium to the public, establishing a special and secure "Consortium Collaboration Tool" for sharing research information among SERIIUS partners, and social media links (Facebook and Twitter).
- SERIIUS research dissemination begins with six journal publications and several conference presentations.
- To provide better focus on research progress, SERIIUS has implemented a procedure for research "Highlights", which reports these accomplishments succinctly on a single-page PowerPoint format that will also be posted on the first page of the Web Gateway. Consortium communications advance with teleconference and videoconference schedules established for Leadership, Research Thrusts, and Research Projects.
- Inter-SERIIUS-partner organization visits have blossomed, and are key to ensuring research interactions, sharing of results, fostering relationships, and maintaining the enthusiasm for SERIIUS among members.

Building Energy Ef ciency

The **US-India Joint Centre for Building Energy Research and Development (CBERD)** will conduct collaborative research and promote clean energy innovation in the area of energy efficiency in building with measurable results and significant reduction in energy use in both nations. CBERD is co-led by the CEPT University-Ahmedabad and the Lawrence Berkeley National Laboratory and includes the following partners:

Collaborating Institutions, India	Collaborating Institutions, USA
Lead Institution: Center for Environmental Planning and Technology (CEPT) University, Ahmedabad	**Lead Institution:** Lawrence Berkeley National Laboratory
Other Academic Partners: 1. International Institute of Information Technology, Hyderabad 2. Malaviya National Institute of Technology, Jaipur 3. Indian Institute of Technology, Bombay 4. Indian Institute of Management, Ahmedabad 5. Auroville Center for Scientific Research 6. Indian Green Building Center, CII 7. Indian Society of Heating Refrigeration and Air Conditioning Engineers 8. Rajasthan Electronics and Instruments Limited 9. Indian Society of Lighting Engineers	**Other Academic Partners:** 1. Lawrence Berkeley National Laboratory 2. Arizona State University 3. Carnegie Mellon University 4. Colorado School of Mines 5. Massachusetts Institute of Technology 6. Purdue University 7. Stanford University 8. University of Central Florida 9. University of South Florida 10. Washington University
Other Industry Partners: 1. Asahi India Glass 2. Biodiversity Conservation India 3. Infosys Technologies. 4. Neosilica Technologies 5. Oorja Energy Engineering Services 6. Paharpur Business Centre/Green Spaces 7. PLUSS Polymers 8. Philips Electronics India 9. Saint Gobain Corp 10. Schneider Electric India 11. Sintex Industries Limited 12. Skyshade Daylights 13. Wipro EcoEnergy 14. Glazing Society of India	**Other Industry Partners:** 1. Autodesk, Inc. 2. California Energy Commission 3. Delphi 4. enLighted Inc. 5. Honeywell 6. Infosys Public Services 7. Ingersoll-Rand/Trane 8. Lighting Science Group Corp 9. Nexant 10. Saint Gobain Corp 11. SAGE Electrochromics 12. SynapSense 13. The Weidt Group 14. Bay Area Photovoltaic Consortium 15. City of San Jose 16. HOK Architects 17. Natural Resources Defense Council

The JCERDC Indian grant was awarded to CBERD on 29 November 2012. The Total JCERDC Grant-in-aid for the project (over 5 years) is Rs. 22,52,69,000/- with a first year release of Rs. 550.912 Lakhs. CBERD focuses on the integration of information technology with building controls and physical systems for commercial/high-rise residential units.

The highlights of the first year include the following:

- Consortia management office (CMO) facilitated interactions between India and US R&D partners as well as industry. For effective research operations, a detailed milestone and deliverable document was prepared jointly by researchers. Under this task IP framework document was prepared covering IP management plan.
- **Simulation and Modeling:** A detailed design specification for the natural ventilation system interface has been developed. To develop materials and construction database for energy simulation, the CBERD team has identified selection criteria to shortlist materials from a wide range of construction materials available in India.

Back to Contents

The CBERD team also has prepared set of rules for Energy Conservation Building Code of India.

- **Monitoring and Benchmarking:** This study focused on historical summary, anecdotal evidence, markets covered, and methodology analysis of the two major benchmarking programs in India - the BEE Building Star Rating program and the ECO-III benchmarking program. Further, analysis was also conducted of the achievements and limitations of both the programs.
- **Controls and Communication Integration:** Various luminaire products available in India have been identified for effective control mechanism. A concept for Smart Luminaire Controller (SLC) which integrates occupancy status, lux level, temperature and input current to the luminaire has been developed.
- **Envelop / Passive Design:** Development of material characterization database has been initiated with approximately 100+ material tested. Specification for Guarded Hot Box and Hygrothermal test facilities was developed. Cool roof calculator has been enhanced and the backend is being updated to include radiant barrier systems and to run a parametric simulation to optimize insulation thickness for a given roof albedo and radiant barrier system. Characterization of glass products was done. This data will be available in International Glass Database maintained by LBNL. CBERD team has included 65 weather files for Indian locations in the COMFEN database for the Indian version. This along with India version of COMFEN has been initiated. Criteria of selection for naturally ventilated buildings to be monitored were defined and a matrix was prepared listing all possible candidates for the study.
- **Advanced Technologies:** Literature review and market research on non-compressor based DOAS systems was undertaken to identify various options available in the market, their features, advantages and limitations. Literature review and market research on MCHXs was undertaken to identify various issues that need to be addressed.
- **Comfort Studies:** Research methods for Online Survey finalized. Thermal Comfort Chamber construction initiated with identification specifications and standard procedure to operate.
- **Grid Responsive Buildings:** The team has conducted extensive literature review. This is relative to year 1 and 2 deliverable to conduct a scoping study to link building technologies to Smart Grid needs and integration of building control systems to supply-side.
- **Renewable Integration:** The study of literature, range of RE products for building integration has been done. Discussions were held with the US – R&D institutional partner LBNL. The CBERD team has identified the following technologies for primary considerations in building integration: (1) Solar Air Conditioning (2) Enhanced use of solar energy in buildings: Embedded PV in windows, overhangs, dynamic façade, and optimization of roof top BIPV to be mainly considered.
- **Scientific Collaboration:** CEPT, MNIT and IIIT from India interacted with UCB and RPI to establish student exchange program and expert exchange program. RPI would host a training program in India in the third quarter of 2013. UCB has given a scholarship to a post graduate student to carry out research under the CBERD project.

Second Generation Biofuels

The **US-India Consortium for development of Sustainable Advanced Lignocellulosic Biofuel Systems** emphasizes on sustainable feedstock cultivation and supply, biochemical conversion technologies for production of second generation biofuels with minimal environmental impact, and analysis of overall sustainability and supply chain of feedstock. The consortium is co-led by the Indian Institute of Chemical Technology-Hyderabad and the University of Florida-Gainesville and includes the following partners:

Collaborating Institutions, India	Collaborating Institutions, USA
Lead Institution: Indian Institute of Chemical Technology, Hyderabad	**Lead Institution:** University of Florida
Other R &D Institutions and Academia Partners: 1. International Crops Research Institute for the Semi-Arid Tropics- Hyderabad 2. Directorate of Sorghum Research-Hyderabad 3. Jawaharlal Nehru Technological University-Hyderabad 4. Tamil Nadu Agricultural University 5. Rajamatha Vijayaraje Sindia Krishi Vishwa Vidyalay, Gwalior 6. Centre for Economic and Social Studies 7. Indian Institute of Technology-Delhi 8. Indian Institute of Technology-Chennai	**Other R & D Institutions and Academia Partners:** 1. University of Missouri 2. Virginia Tech 3. Montclair State University 4. Texas A&M University
Industry Partners: 1. Abellon Clean Energy 2. Hindustan Petroleum Corporation Limited	**Other Industry Partners:** 1. Show Me Energy 2. Green Technologies

The Indian JCERDC grant was awarded on 22 November 2012. The Total JCERDC Grant-in-aid for the project (over 5 years) is Rs. 12,88,86,000/- with a first year release of Rs. 555.14 Lakhs. The project comprises of three work packages – WP-1 involves the feedstock development and supply, WP-2 focuses on the conversion technologies, and WP-3 addresses sustainability, marketing and policy.

The highlights of first year are as follows:

- High biomass sorghum genotypes were screened for various agronomic traits (plant height, fresh yield, stover yield, etc.) during the post-rainy season for potential high biomass producing lines. Thirty-six HBM genotypes were identified, out of which 10 showed superior stalk yields.
- Similarly, 10 high biomass producing sorghum lines tolerant to drought stress were identified on the basis of screening done under glass house conditions. Seed multiplication of the potential sorghum lines was performed during the post-rainy (rabi) season for conducting multilocation trials (MLT's) in the partner organizations for the rainy (kharif) season.
- Land survey for the cultivation of coarse cereals as well as sorghum was conducted in various areas of Madhya Pradesh involving ICRISAT, DSR and RVSKVV scientists. Sites for conducting MLT's for sorghum and pearl millet were identified as well. Preliminary interactive survey with local farmers with regards to cultivation of sorghum and pearl millet for biomass production was conducted by CESS group.
- Abellon has collected 20 different bamboo germplasm from various parts of India after consulting with National Bamboo Mission (NBM). Six out of 20 germplasm lines have been established at Modasa for further studies, while others are in the process of being established.
- A stress tolerance study of existing Bamboo balcooa under in-vitro and in-vivo conditions is ongoing. Genetic variation studies conducted on 6 varieties of Bamboo using molecular approaches showed Bambusabalcooa to be the most diverse variety. Pre-processing and commutation of 5 lignocellulosic biomass samples of sorghum and pearl millet was optimized at HPCL and the commuted biomass was dispatched to the WP-2 partners involved in conversion technology.
- Cellulolytic fungi from various biosphere zones were isolated and 21 fungal cultures

Back to Contents

were identified at TNAU. Standardization of alcohol fermentation to establish base levels on glucose substrate using in-house Saccharomyces cerevisiae has been initiated at IIT-D. Similarly, standardization of pre-treatment variables of the biomass samples, isolation of microbial strains from various biosphere zones, and screening of biomass degrading-enzymes (xylanase and cellulase) have been initiated at IICT.

- Abellon has reviewed and compiled globally available documents on certification systems. They have consulted three independent experts working in the fields of social/woman development, extension education, CESS, and an NGO group for their inputs on the design of the baseline survey forms.
- Similarly, primary and secondary data with respect to non-food based biofuels has been reviewed and compiled. CESS has independently compiled a questionnaire for the baseline survey after a preliminary visit to the field sites of Indore and Gwalior in Madhya Pradesh.

India-US Energy Dialogue 2012

Shri B. K. Chaturvedi, Member, Planning Commission of India and Dr. Steven Chu, Secretary, US Department of Energy (DoE), co-chaired the I**ndia-US Energy Dialogue** on September 28, 2012, in Washington DC. The US-India Energy Dialogue was launched on May 31, 2005 to promote increased trade and investment in the energy sector, through identification of further areas of co-operation and collaboration, while actively working with both the public and private sectors. Five working groups have been set up under the initiative in areas, e.g., oil & gas, coal, power and energy efficiency, new technologies & renewable energy and civil nuclear co-operation. The two sides lauded the successful implementation of the decision by Prime Minister Dr. Manmohan Singh and President Obama in November 2010 in Delhi to establish a "virtual" J***oint Clean Energy Research and Development Center (JCERDC), which is the first bilateral initiative designed specifically to promote clean energy initiative by team of scientists from India and the United States, with a total joint committed funding from both Governments of US $ 50 million.*** The Center has funded three research projects, in the areas of solar energy, second generation bio-fuels and energy efficiency of buildings. The research consortia, which represent reputed science and technology institutions of both countries, made detailed presentations on their plans of action and research outcomes.

United States - India Science and Technology Endowment Fund

Contact Persons:
Smriti Trikha
Indo-US S&T Forum
New Delhi
E-mail: strikha@indousstf.org

The **United States–India Science & Technology Endowment Fund (USISTEF)** was established in 2009 by the Governments of the United States of America (through the Department of State) and India (through the Department of Science & Technology). The fund envisages to support and foster joint applied R&D to generate public good through commercialization of technology achieved through sustained partnerships between US and Indian researchers and entrepreneurial initiatives. These initiatives can originate from government, academic, non-governmental or commercial entities, and any combination thereof provided they focus on applied R&D, incorporate a business plan and proof of commercial concept, and have significant sustainable commercial potential. The program is coordinated and administered through the bi-national **Indo-US Science and Technology Forum (IUSSTF)**.

The areas covered under the program are (1) **Healthy Individual** with a focus on affordable biomedical devices, diagnostic/ preventive/ curative measures, or food and nutrition products to improve health, and (2) **Empowering Citizens** with a focus on reducing the digital/technology divide including others, information and communication technologies with societal impact in areas such as water, agriculture, financial inclusion, and education.

An **Indo-US Innovation Partnerships Event** supported by the Department of Science and Technology (DST), Govt. of India and the US Embassy was held at New Delhi on May 8, 2012. The then Indian Minister of Science and Technology (Late) Mr. Vilasrao Deshmukh and Secretary of State Hillary Rodham Clinton graced the event with their presence. The two leaders applauded the first award of grants by the US-India Science and Technology Endowment Board.

The Second Call for Executive Summaries was announced in February 2012 and over 199 executive summaries (94 in Empowering Citizens and 105 Healthy Individual categories) were received in response. After a multi-phase review process, top applicants were invited to make an in-person presentation to the US-India Endowment Board. At the end, the following three exciting business plans were selected for Endowment funding:

A novel way to manage fecal incontinence in non-ambulatory patients

Nishith Chasmawala, Consure Medical Pvt. Ltd., Surat

Matt Durack, Lunar Design, San Francisco

The Problem: Fecal incontinence - the inability to control the release of stool, is a ubiquitous clinical problem that affects more than 50 million patients globally. The absence of an adequate management solution for fecal incontinence leads to increased utilization of hospital resources and adversely impacts the mortality by 7%.

The Solution: The team has developed a self-expanding device to manage fecal incontinence in non-ambulatory patients with a unique placement, deployment and withdrawal mechanism. The device requires minimal training and can be administered without the need for imaging and works on all patients, irrespective of their stool type or sphincter tone. The product offers a hygienic insertion mechanism and is overall very sanitary and patient friendly.

Mobile Phone based HbA1c Analyzer

Sidhant Jena, Janacare Solutions Private Limited, New Delhi

Stephen Chen, Teco Diagnostics, Anaheim

The Problem: There is an acute need for a low-cost and portable Hb1Ac monitor top screen and manage diabetes in the developing world. However, most standardized HbA1c monitors and expensive, bulky and assay based systems and thus not suited for mass adoption.

The Solution: The team proposes to co-develop a low-cost mobile phone platform to measure HbA1c. Their novel platform comprises of two components- a colorimetric test strip for HbA1c and a software application that uses the phone's camera to analyze the test strip. Additionally, the software application can provide automated decision support and transmit data to remote specialists, thus enabling millions of field health workers to screen and manage diabetes in even the most remote communities.

Branchless Banking and Financial services for the Unbanked and Under-banked

Abhipriya Gupta, Eko India Financial Services Private Limited, New Delhi

Angela Schmuck, IDmission LLC, Mesa AZ

The Problem: A large section of the Indian population (~500 million) still remains without access to banking services. Traditional financial service delivery models have failed to serve low income populations.

The Solution: Building a low-cost payment infrastructure for instant small value financial transactions by leveraging existing retail shops, tele-connectivity and banking infrastructure to extend branchless banking services to the common man. The project aims to deliver financial services efficiently and at scale through smart phone based application mechanism integrating with the Unique Identity UID).

In December 2012, IUSSTF announced the third call for the USISTEF program and over 202 Executive Summaries (74 in Empowering Citizens and 128 in Healthy Individual categories) were received in response. On the basis of a Joint Expert Panels review, 19 proposals (9 in Empowering Citizens and 10 in Healthy Individual categories) were shortlisted for business plans submission. The shortlisted teams will present their detailed business plans before the Joint Indo-US Expert Panel in April 2013.

PUBLIC-PRIVATE PARTNERSHIP PROGRAMS

DST-Lockheed Martin India Innovation Growth Program

Contact Persons:
Sid Burback
IC² Institute, University of Texas, Austin
E-mail: sid@icc.utexas.edu

Nirankar Saxena
Federation of Indian Chambers of Commerce and Industries, New Delhi
E-mail: innovations@ficci.com

The **DST-Lockheed Martin India Innovation Growth Program (IIGP)** was launched in 2008 to enhance the growth and development of entrepreneurial economy in India by adopting the prevalent best practices both in US and India. IIGP is designed as an accelerated technology assessment and commercialization initiative through a business plan competition involving commercial assessment of technology; business development; and finally technology commercialization through structured mentoring. The Program is jointly funded by the Department of Science and Technology, Government of India and the Lockheed Martin Corporation, USA, a premier systems integrator and global security enterprise principally engaged in the research, design, development, manufacture, integration and sustainability of advanced technology systems, products and services. The IIGP is implemented by IC² Institute, University of Texas - Austin, the Federation of Indian Chambers of Commerce and Industries (FICCI) and IUSSTF.

The aim of this public-private initiative is to identify, award, mentor and hence accelerate innovative Indian technologies into new markets in India, United States and around the world. The unique feature of the IIGP is its focus on mentoring through professional business development engagement and applying world-class commercialization strategies to bright ideas that have potential towards market realization by a quick look commercialization analysis at IC² Institute and FICCI.

The Program is open to technologies in areas such as aeronautics, agriculture, biotechnology, chemistry, communications, computing, defence, electronics, environment, IT, manufacturing, marine, materials, medical/life sciences, nanotechnology, etc.

The following technologies were announced as the winners of the 2012 competition:

Technology: **A man portable unmanned ground vehicle robot for defense surveillance / reconnaissance and bomb disposal**
Innovator: **Aakash Sinha**
Company/Institution: Omnipresent Robot Technologies Pvt. Ltd.

Back to Contents

Technology: **From waste to wealth through recycled tungsten carbide alloy powders and products**
Innovator: **A. Jayakannan**
Company/Institution: Aeyyes Tungsten

Technology: **HyCator cavitation reactors**
Innovator: **Anjan Mukherjee**
Company/Institution: HyCa Technologies Pvt. Ltd.

Technology: **Plastic biochip-based disposable electrochemical immune-sensor**
Innovator: **Priyanka Sharma**
Company/Institution: Institute of Microbial Technology

Technology: **Solar photo voltaic water pumping using extended MPPT with purification**
Innovator: **Praveen Jambholkar**
Company/Institution: Cybermotion Technologies Pvt. Ltd.

Technology: **Drug discovery/drug-target identification technology**
Innovator: **Chaitanya Saxena**
Company/Institution: Shantani Proteome Analytics Pvt. Ltd.

Technology: **ViTranSP (virtual transaction service provider)**
Innovator: **Ramesh Baswa**
Company/Institution: BASIX Sub-K iTransactions Ltd.

Technology: **A novel strategy of botanical biocides to control eriophyid mite in coconuts to improve productivity**
Innovator: **P.S. Mukherjee**
Company/Institution: IMMT

Technology: **User-wearable portable communication device**
Innovator: **Rajendra P. Sadhu**
Company/Institution: Vyzin Electronics Pvt. Ltd.

Technology: **Safety medical device**
Innovator: **Manoj Kumar**
Company/Institution: Maan Mecmaan

Technology: **A process of making lifestyle wellness garments**
Innovator: Rajiv Rai Sachdev
Company/Institution: Advantage Organic Naturals Technologies Pvt. Ltd. in collaboration with IIT Delhi

Technology: **Ef cient high throughput human cell-based screen for detection of DNA damaging agents**
Innovator: **Sunil Kumar**
Company/Institution: Anthem Biosciences Pvt. Ltd.

Technology: **First ever file format for security**
Innovator: **Prakash Baskaran**
Company/Institution: Pawaa Software

Technology: **PC Plug-In 12 Lead ECG**
Innovator: **Ravi Mehrotra**
Company/Institution: National Physical Laboratory, CSIR

Technology: **Remote controlled system for power tiller**
Innovator: **Prajwal V. Kumar**
Company/Institution: Mangalore Robautonics Pvt. Ltd.

Technology: **Rainrunner**
Innovator: **Karan Randhawa**
Company/Institution: Roof For Two

Technology: **Branchless banking technology solution combined with extensive distribution channel**
Innovator: **Sameer Prem**
Company/Institution: Mint-Today

Technology: **Development of bioplastics from agricultural waste**
Innovator: **M.S. Shankara Prasad**
Company/Institution: SPC Biotech Pvt. Ltd.

Technology: **Energy-ef cient compressor**
Innovator: **Vijay Jain**
Company/Institution: Partnership Concern

Technology: **Low-cost photo bioreactor system for cultivation of micro algae**
Innovator: **Srinivas Gogineni**
Company/Institution: Green Cell biotech Pvt. Ltd.

Technology: **Eco Pots**
Innovator: **Vijayan**
Company/Institution: Neuecotechs

Technology: **Fast and accurate method for solidification simulation of metal casting**
Innovator: **B. Ravi**
Company/Institution: Indian Institute of Technology Bombay

Technology: **Ear, nose and throat multiscope and recorder**
Innovator: **Sapna Behar**
Company/Institution: Icarus Design Pvt. Ltd.

Technology: **Additive manufacturing machine/3D part printer**
Innovator: **Jeldi Bala Anand**
Company/Institution: JB Design Technologies

Technology: **Hydrogen-fuelled engine**
Innovator: **Lalit Mohan Das**
Company/Institution: Indian Institute of Technology, Delhi

Back to Contents

Technology: **A system and method for price forecasting**
Innovator: **V.S.K. Murthy Balijepalli**
Company/Institution: Indian Institute of Technology Bombay

Technology: **Zed sun-zyme foliar spray**
Innovator: **Chandrasekhar Hariharan**
Company/Institution: Biodiversity Conservation India Pvt. Ltd.

Technology: **Motorcycle-operated multipurpose farm implement**
Innovator: **Mansukhbhai Jagani**
Company/Institution: National Innovation Foundation

Technology: **Milking machine**
Innovator: **Raghav Gowda**
Company/Institution: National Innovation Foundation

Technology: **Def uoridation of water and removal of arsenic from groundwater**
Innovator: **Pawan Labhasetwar and Subhash Andey**
Company/Institution: National Environment Engineering Research Institute

A Technology Commercialization and Entrepreneurship Workshop was organized from March 12-16, 2012, at Goa to provide training to the innovators and to also prepare them to participate in an Innovator's Competition. The top 50 selected innovators were given advanced training in technology commercialization strategies, venture formation, venture finance, technology marketing, competitive technology strategies and presentation skills by experienced faculty members from the University of Texas at Austin. Also, each of the 50 selected innovators was provided with an in-depth market analysis report on their technology viz. the Quicklook report technologies prepared by subject matter experts.

An Innovators' Competition was organized during March 26-29, 2012, at the Federation House, New Delhi followed by an Awards Ceremony on March 29, 2012. The top 50 innovators presented their innovations to a panel of technologists and commercialization experts from India and the United States. At the end of the competition, 30 best innovations were presented with a cash award of Rs. one lakh. Further, the selected innovators are being provided business development support by the Federation of Indian Chambers of Commerce and Industry and the IC^2 Institute at the University of Texas at Austin.

Two Technology Expositions (Hyderabad Technology Expo, 26 September 2012 and Chandigarh Technology Expo, 19 December 2012) were organized under the DST-Lockheed Martin India Innovation Growth Program in 2012-13 to showcase the commercialization deals signed by the Indian innovators with leading industry partners.

VISITATION PROGRAMS

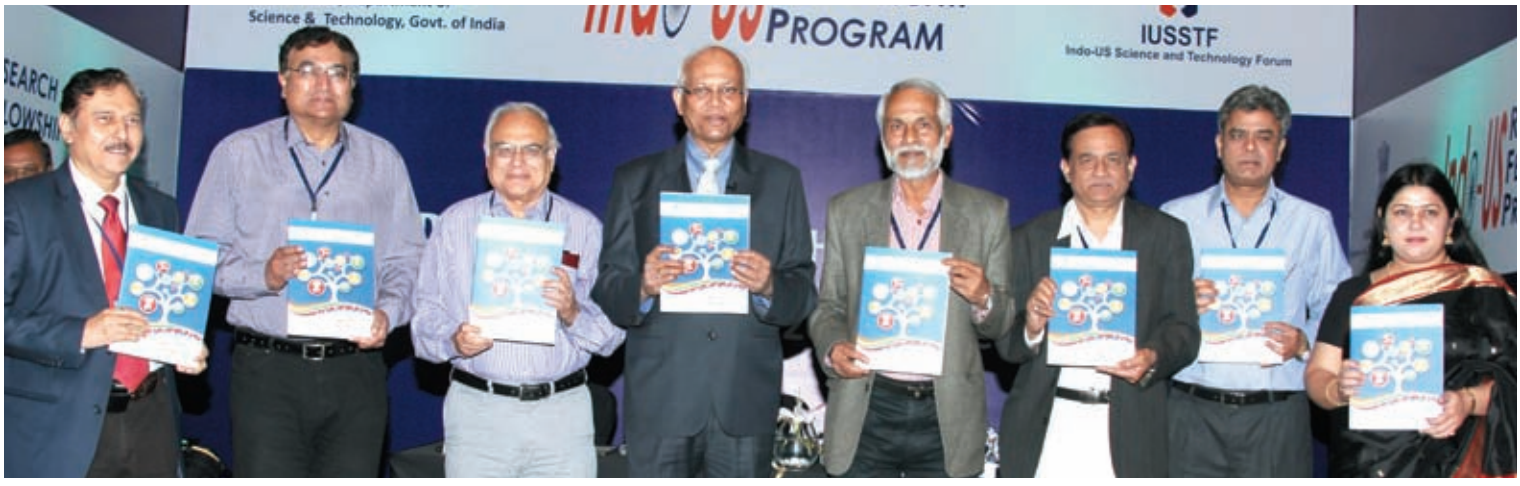
Indo-US Research Fellowships

Contact Person:
Smriti Trikha
Indo-US S&T Forum, New Delhi
E-mail: strikha@indousstf.org

In an effort to augment scientific excellence in emerging areas of science and technology, IUSSTF announced the fifth batch of **Indo-US Research Fellowships** awarded to 28 outstanding young researchers from India below the age of 40, to carry out research in frontier areas of science and technology at a leading institution in the United States. This fellowship is aimed to introduce Indian scientists and engineers from leading academic institutions and laboratories, in the early stages of their careers, to research opportunities in the US thereby helping to forge long-term collaborative relationships and linkages between the scientific communities of the two nations.

This prestigious fellowship scheme was formally launched in August 2007 by T. Ramasami, Secretary-DST and Co-Chair, IUSSTF, and is implemented with funding support from the Science and Engineering Research Council (SERC) of the Department of Science and Technology (DST), Government of India. The fellowship will allow the awardees to spend

Back to Contents


Science & Technology, Govt. of India
PROGRAM
IUSSTF
Indo-US Science and Technology Forum


FIRST INDO – US RESEARCH

Back to Contents

between 3 to 12 months in any premier host institution in USA and will cover monthly stipend, return air-fare, preparatory allowances, conference allowances, etc.

The areas covered under the fellowship include atmospheric and earth sciences; chemical sciences; engineering sciences; life sciences; medical sciences; mathematical and computational sciences; and, physical sciences.

The Department of Science and Technology (DST) Government of India and Indo-US Science and Technology Forum, New Delhi (IUSSTF) organized the First **Indo-US Research Fellows Conclave** at Pune, India from 15-17 March 2013. Since 2007, 119 fellowships have been awarded to young and bright Indian researchers. In addition to several joint publications in peer reviewed journals, most of the IUSSTF Research Fellows have received project funding from National Funding agencies and have been the proud recipient of several prestigious awards. The two-day event highlighted the research work carried out by the IUSSTF Research Fellows in the United States during their fellowship. The keynote speaker, Dr. R.A. Mashelkar, National Research Professor & President, Global Research Alliance, National Chemical Laboratory, Pune, motivated the audience with his talk on **"Science led Innovation"**. He spoke on the importance of bridging the gap between knowledge and its practical application. The Conclave was an opportunity for the IUSSTF Research Fellows to share their thoughts and experiences not just with the funding agencies, program administrators, and policy makers, but also with fellow researchers.

Indo-US Research Fellows 2013 are:

A. Vanniarajan, Aravind Medical Research Foundation, Chennai
US Host: Arupa Ganguly, University of Pennsylvenia, Philadelphia
Subject area: Retinoblastoma genetics

Amit Sethi, Indian Institute of Technology, Guwahati
US Host: Peter Gann, University of Illinois at Chicago
Subject area: Application of machine learning and image processing to the study of prostate cancer risk assessment and treatment response using morphometry of histological images

Ankhi Roy, Indian Institute of Technology, Indore
US Host: Moskov Amaryan, Old Dominion University, Norfolk
Subject area: Experimental hadron physics

Arup Kumar Nandi, CSIR-Central Mechanical Engineering Research Institute, Durgapur
US Host: Robert G. Landers, Missouri University of Science and Technology, Rolla
Subject area: Manufacturing

Ashutosh Tiwari, Translational Health Science & Technology Institute, Gurgaon
US Host: Anindya Bagchi, Masonic Cancer Center, University of Minnesota, Minneapolis
Subject area: Molecular biology

B. Parameswari, Sugarcane Breeding Institute, Coimbatore
US Host: S.P. Dinesh Kumar, University of California, Davis
Subject area: Virus induced gene silencing

Bapurao B. Shingate, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
US Host: Larry E. Overman, University of California, Irvine
Subject area: Organic synthesis

Bilal Ahmad Bhat, CSIR-Indian Institute of Integrative Medicine, Srinagar
US Host: Salvatore D. Lepore, Florida Atlantic University, Boca Raton
Subject area: Total synthesis of natural products

Bireswar Das, Indian Institute of Technology, Gandhinagar
US Host: Eric Allender, Rutgers University, New Jersey
Subject area: Computational complexity theory

Bittagopal Mondal, CSIR-Central Mechanical Engineering Research Institute, Durgapur
US Host: Partha P. Mukherjee, Texas A&M University, College Station
Subject area: Water management in PEM fuel cell

Back to Contents

Debarati Paul, Amity Institute of Biotechnology, Noida
US Host: Andy Ogram, University of Florida, Gainesville
Subject area: Molecular microbial ecology with respect to bioremediation of contaminated environment

Dhanjit Kumar Das, National Institute for Research in Reproductive Health, Mumbai
US Host: Vishwajit L. Nimgaonkar, University of Pittsburgh, Pittsburgh
Subject area: Molecular genetics

Dibyendu Chakravarty, The International Advanced Research Centre for Powder Metallurgy and New Materials, Hyderabad
US Host: P M Ajayan, Rice University, Houston
Subject area: Synthesis of nanopowders using Induction plasma technique, spark plasma sintering of nanocomposites for structural applications

Erathimmanna Bhoje Gowd, CSIR-National Institute for Interdisciplinary Science and Technology
US Host: Tadanori Koga, Stony Brook University, Stony Brook
Subject area: Polymer science and technology

Himadri Sekhar Das, Assam University, Silchar
US Host: Ludmilla Kolokolova, University of Maryland
Subject area: Astrophysics

K. Tirumalesh, Bhabha Atomic Research Centre, Mumbai
US Host: Carol Kendall and Megan Young, Isotope Tracers Project, US Geological Survey
Subject area: Contaminant hydrology and biogeochemistry in surface and groundwater systems

Konjengbam Darunkumar Singh, Indian Institute of Technology, Guwahati
US Host: Zdenek P. Bazant, Northwestern University, Evanston
Subject area: Tubular structures

Madhurima Jana, National Institute of Technology, Rourkela
US Host: Alexander D. MacKerell Jr., University of Maryland
Subject area: Computer simulation of biomolecules

Madhusudan Reddy Nandineni, Centre for DNA Fingerprinting and Diagnostics, Hyderabad
US Host: Arthur Eisenberg, University of North Texas Health Science Center, Fort Worth
Subject area: Human forensic DNA profiling

Manas Kumar Dalai, CSIR-National Physical Laboratory, New Delhi
US Host: T. C. Chiang, University of Illinois at Urbana- Champaign
Subject area: Experimental condensed matter physics

Mani Bhushan, Indian Institute of Technology, Mumbai
US Host: Lorenz T. Biegler, Carnegie Mellon University, Pittsburgh
Subject area: Efficient decentralized constrained state estimation

Manjusha V. Shelke, CSIR-National Chemical Laboratory, Pune
US Host: P. M. Ajayan, Rice University, Houston
Subject area: Synthesis of functional nanomaterials and hybrid devices for electrochemical charge storage

Nripen Chanda, CSIR-Central Mechanical Engineering Research Institute, Durgapur
US Host: Michael J and Sharon R. Bukstein, University of Missouri-Columbia
Subject area: Fabrication of micro/nano devices (e.g. sensors, actuators, drug delivery systems) for biomedical application

Parimal Acharjee, National Institute of Technology, Durgapur
US Host: Sukumar Brahma and Wenxin Liu, New Mexico State University, Las Cruces
Subject area: Intelligent control and protection of smart grid

Patri Venkata Srilakshmi, National Institute of Technology, Warangal
US Host: Kaushal Rege, Arizona State University, Tempe
Subject area: Bio-organic Chemistry (Non-viral gene delivery)

Priyanka Ghosh, Indian Institute of Technology, Kanpur
US Host: Ronald Y.S. Park, University of Colorado, Boulder
Subject area: Soil dynamics and earthquake geotechnical engineering

Rajarshi Pal, Manipal University, Manipal
US Host: Kapil Bharti, National Eye Institute, Bethesda
Subject area: Stem cell biology

Rakesh Kumar Singh, Banaras Hindu University, Varanasi
US Host: H L. Nakhasi, Centre for Biologics Evaluation and Research, Bethesda
Subject area: Infectious tropical diseases

Back to Contents

Ramakrishnan Ganeshan, Birla Institute of Technology & Science-Pilani, Hyderabad Campus
US Host: Ganpati Ramanath, Renesselaer Polytechnic Institute, Troy, New York
Subject area: Mesostructured nanothermoelectric materials for heat management and energy harvesting

Ram Rup Sarkar, CSIR-National Chemical Laboratory, Pune
US Host: Ilya Shmulevich, Institute for Systems Biology, Seattle
Subject area: Theoretical studies of biological systems at different levels and scales

Ranjan Kumar Jana, S.V National Institute of Technology, Surat
US Host: Bruce C. Berndt, University of Illinois at Urbana-Champaign
Subject area: Bessel function series

Ranjan Tamuli, Indian Institute of Technology, Guwahati
US Host: Katherine A. Borkovich, University of California Riverside
Subject area: Cell signaling in Neurospora crassa

Sandeep Kumar Sharma, Bhabha Atomic Research Centre, Mumbai
US Host: Allen Paine Mills Jr., University of California Riverside
Subject area: Fabrication and testing of micro cavities for Bose-Einstein condensation of positronium and annihilation gamma ray laser research

Sanjay Yadav, CSIR-Indian Institute of Toxicology Research, Lucknow
US Host: Levi J. Beverly, James Graham Brown Cancer Center, Louisville
Subject area: Lung cancer and post-transcriptional regulation of ubiquitin

Sanjib Kumar Panda, Assam University, Silchar
US Host: Leslie M.Hicks, Donald Danforth Plant Science Center, St Louis
Subject area: Plant proteomics

Sarika, CSIR-Central Drug Research Institute, Lucknow
US Host: Dwight German, University of Texas, Dallas
Subject area: Central Nervous System diseases

Seraj Ahmad Ansari, Bhabha Atomic Research Centre, Mumbai
US Host: Linfeng Rao, Lawrence Berkeley National Laboratory, Berkeley
Subject area: Nuclear waste remediation

Shivakumar Angadi, CSIR-Institute of Minerals and Materials Technology, Bhubaneswar
US Host: J. D. Miller, The University of Utah, Salt Lake City
Subject area: Processing of rare earth minerals

Suboj Babykutty, Mar Ivanios College, Trivandrum
US Host: Rakesh K. Jain, Harvard Medical School Boston
Subject area: Role of nitric oxide in tumor metastasis

Sudheesh Kumar Kattumannil, Indian Statistical Institute, Kolkata
US Host: Hira L Koul, Michigan State University, East Lansing
Subject area: Time series analysis

Suresh Kumar, University of Delhi, New Delhi
US Host: Filip G. Kondev, Argonne National Laboratory, Lemont
Subject area: Experimental nuclear physics and nuclear data evaluation

Uma Shankar, CSIR-National Geophysical Research Institute, Hyderabad
US Host: Anne Martin Trehu, Oregon State University, Corvallis
Subject area: Gas hydrates (marine seismic)

Back to Contents

Stanford India Biodesign Fellowships

Contact Persons:
Balram Bhargava
All India Institute of Medical Sciences,
New Delhi
E-mail: balrambhargava@yahoo.com

Paul Gordon Yock
Stanford University Medical Center,
Stanford
E-mail: yock@stanford.edu




The **Stanford-India Biodesign (SIB) Fellowship** is a leadership training program in biomedical technology innovation initiated by the Indian Department of Biotechnology (DBT), Govt. of India, and Stanford University in partnership with IUSSTF. The goal of this program is to train the next generation of biomedical technology innovators in India through a fellowship to be held jointly at Stanford University, the Indian Institute of Technology (IIT)-Delhi, and, All India Institute of Medical Sciences (AIIMS), New Delhi. This program is directed to candidates with advanced degrees in engineering, medicine or business who could be potential innovators in early-stage development of new biomedical technologies for emerging healthcare needs.

Over the course of the one-year program, approximately half of the Fellows' time will be spent in India and the other half at Stanford University. The core objective of the program is a multidisciplinary team-based fellowship where SIB fellows will work with other young innovators with a combination of engineering, medical and industry backgrounds. The team will examine clinical needs within the Indian setting, identify opportunities for biomedical technology innovation with the goal to potentially invent, prototype, develop and patent one or more new technologies. Fellows will also be mentored by "real-world" experts from the biomedical technology, legal and venture capital industries both in the United States and India. The program would also include exchange of faculty between the academic institutions.

In February 2013, the Biodesign Faculty have co-authored a paper entitled **Outcomes from a Postgraduate Biomedical Technology Innovation Training Program: The First 12 Years of Stanford Biodesign** which will appear in the Annals of Biomedical Engineering. On November 7, 2012, a second license has been obtained for a device from SIB. HLL of India has licensed the Limb Immobilization device invented in 2009 by Darshan Nayak, Pulin Raje, Rahul Ribeiro and Asokan Thondiyath. HLL Lifecare Limited is a Government of India enterprise under the Ministry of Health & Family Welfare. In August 2012, Consure Medical, the company founded by Stanford India Biodesign alums Nishith Chasmawala and Amit Sharma, received investment from the Indian Innovation Fund, Indian Angel Network and India Venture Partners. The company started out of the SIB fellowship. In June 2012, Manish Butte (low-cost infection detection device), Vineet Singal (Diabetes Compliance using SMS) and Swami Gnanashanmugam (an implantable device for sustained Tuberculosis therapy) won the Spring 2012 Global Exchange grants.

Four outstanding individuals were selected for the 2013 SIB Fellowship:

Anirudh Chaturvedi, with a background in Biomedical Engineering

Prashant Jha, a physician with a background in Bioengineering

Abhinav Ramani, with a background in Mechanical Engineering

Balaji Teegala, with a background in Engineering Design

American Society for Microbiology (ASM) - IUSSTF Microbiology Visiting Professorships

Contact Persons:
Todd Peterson
American Society for Microbiology
Washington DC
E-mail: tpeterson@asmusa.org

Smriti Trikha
Indo-US S&T Forum
New Delhi
E-mail: strikha@indousstf.org

Under an arrangement between IUSSTF and American Society for Microbiology (ASM), the **Indo-US Professorship Awards in Microbiology** were instituted in 2003 with the aim to foster scientific cooperation, education, training and capacity building at individual and institutional levels through exchange visitation. The ASM-IUSSTF Visiting Professorships award is administered parallel with the ASM International Professorship Program.

The program enables:

- Microbiologists in India and the United States to visit institutions in the two countries to teach and interactive short course on a topic in any of the microbiological disciplines (Teaching Professor)
- Microbiologists in India to participate in an interactive short course on a topic in any of the microbiological disciplines, or conduct a research project in partnership with colleague in a research facility in the US (Research Professor)

Open to ASM members and non-members alike, the program seeks to broaden collaboration between India and the US on issues of global concern. Up to eight professorships are offered per program year.

The following visitations were awarded in 2012-13:

Asheesh Yadav from the Institute of Minerals and Material Technology working on Biological Wastewater Treatment, Bhubaneswar India, implemented a research project titled *Study on interaction of iron and microbial communities for developing high performing bioremediation technologies* at Princeton University in Princeton, NJ, USA.

Louise Temple, James Madison University, Harrisonburg, VA, was awarded teaching Professorship to implement the short course on *Discovery and Genomic Analysis of Viruses from the Soil that Infect Non-pathogenic Mycobacterium Bacteria: original science for university students and faculty*, with Dr. Jogender Rana at the Deenbandhu Chhotu Ram University of Science and Technology in Haryana, India.

Nisha Tak, from Jai Narain Vyas University, Jodhpur, was awarded the Professorship award to implement the research project, *Use of Green fluorescent protein (GFP) labeled strains to determine the nodule occupancy and symbiotic promiscuity of novel species of Rhizobium and Burkholderia nodulating native legumes of Indian Thar Desert,* with Dr. Ann Hirsch at the University of California, Los Angeles, USA.

Wei- Mei Ching from the Naval Medical Research Center, Silver Spring, MD was awarded a teaching Professorship to implement a short course on *Genomics and proteomics in diagnostic test design for detection of zoonotic diseases: Utility of these tools in evaluating assays using scrub* at Christian Medical College, Vellore, India.

IUSSTF-American Physical Society (APS) Fellowships

Contact Persons:
Amy K. Flatten
The American Physical Society
College Park, Maryland
E-mail: flatten@aps.org

Michele Irwin
The American Physical Society
College Park, Maryland
E-mail: irwin@aps.org

IUSSTF and the American Physical Society (APS) have partnered to support a bilateral exchange program that includes the **Indo-US Professorship Awards in Physics** which will be awarded to faculties and scientists from India and USA every year to teach short courses or provide physics lecture series and, the **Indo-US Physics Student Visitation Program** for student exchange every year. The program was launched in 2008.

'Professorships and Lectureships' consist of 1-2 week courses or a lecture series delivered at an Indian or US institution. Recipients are selected by a joint APS-IUSSTF review committee, with a call for proposals twice each year. Awards are typically used for travel, materials and expenses associated with course delivery. The objective of the Visiting Professorship is to enable physicists to build strong collaborative linkages in physics education and research between the scientific communities of US and India.

The Physics Student Visitation Program aims to mostly support graduate student travel to India by US citizens, while still enabling some students of Indian citizenship to travel to the United States. These studentship programs will help to build early career relationship between the next generation of physicists from US and India. The students can apply for this visitation program to attend a short-course, or summer training; to visit with a professor in his/her field of study; to work temporarily in a lab; or for any other opportunity that the student/professor feels is worthy of support.

The recipients of the **2012 Indo-US Professorship Awards** in Physics were:

Anirban Kundu, University of Calcutta, Kolkata
Host: Northern Illinois University
Subject area: Lectures on "Theoretical aspects of particle physics"

Elias Towe, Carnegie Mellon University, Pittsburgh
Host: Indian Institute of Technology, Indore
Subject area: Lecture series on "Photonics based on solid state materials"

Erica Carlson, Purdue University, Indiana
Host: Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore
Subject area: Short-course on "Complexity and non-equilibrium phenomena in strongly correlated disordered systems"

Shashi Kanbur, SUNY Oswego, New York
Host: University of Delhi, New Delhi
Subject area: Two-week course on "Stellar pulsation and its applications on stellar astrophysics with an emphasis on statistical methods"

Stephen C. Rand, University of Michigan, Michigan
Host: Indian Institute of Technology-Kharagpur
Subject area: Lecture Series on "Nonlinear and quantum optics"

Parongama Sen, University of Calcutta, Kolkata
Host: Brandeis University
Subject area: Lecture series on "Application of Statistical Physics in Interdisciplinary Topics"

Michael Weinert, University of Wisconsin-Milwaukee
Host: Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Subject area: Lectures and hands-on session on "Dirac materials—graphene and topological insulators—with an emphasis on first principles density-functional theory"

V. Kumaran, Indian Institute of Science, Bangalore
Host: University of Florida
Subject area: Lecture series on "Condensed Matter Sciences in Physics and the PIRE center for multiphase f ows in Chemical Engineering"

The recipients of the 2012 Indo-US Physics Students Visitation program are:

Ashoka Bali, Indian Institute of Science, Bangalore
Host: Jeffrey Snyder, California Institute of Technology
Research area: Thermoelectric materials and transition to devices for waste heat recovery

Arindam Das, University of Alabama, Tuscaloosa
Host: Partha Konar, Physical Research Laboratory, Ahmedabad
Research area: Particle and collider phenomenology

Hui-Yiing Chang, Vanderbilt University, Tennessee
Host: T. Padmanabhan, Inter University Center for Astronomy and Astrophysics, Pune
Research area: ISW effect in both the inf ection point dark energy model and in the viscous dark f uid model

Haridas Pai, Argonne National Laboratory
Host: Variable Energy Cyclotron Centre, Kolkata
Research area: Digital data acquisition system for the Gammasphere

Back to Contents

Deepika Saini, Clemson University, South Carolina
Host: A.K. Raychaudhuri, S.N Bose National Centre for Basic Science, Kolkata
Research area: Effects of topological defects and the presence of catalyst particle on the electrical response of carbon nanostructures to develop and understanding of the transport mechanisms in these structures.

K.K. Mashood, Tata Institute for Fundamental Research, Mumbai
Host: University of Washington
Research area: Prof. Paula Heron, Physics Education Research

Research Internships in Science and Engineering

Contact Person:
Smriti Trikha
Indo-US S&T Forum, New Delhi
E-mail: strikha@indousstf.org

The Indo-US Science and Technology Forum supported **Research Internships in Science and Engineering** (RISE) program provides unique opportunities for science, technology, engineering and medical students from the United States to undertake internships in national laboratories, federal research centers, academic research institutes, and private R & D laboratories in India. Objectives of the internships are to provide students exposure to Indian S&T milieu, gain practical skills and develop collaborative networks. Internships are envisaged as a source of mutual cultural and professional enrichment for both the interns and their host institutions. The result will be the development of joint efforts that builds long-term collaboration and mutually beneficial professional relationships.

Indian and American citizens currently enrolled at a recognized institution of higher education pursuing Doctoral programs in science, engineering, technology and medical disciplines are eligible to apply for the internship. The internships will provide for monthly stipend, accommodation and airfare. The RISE program was formally launched by IUSSTF in December 2008.

The following 10 students interned in India under the RISE Program in 2012-2013:

Abhishek Gupta, University of Illinois, Urbana-Champaign
Mentor: Vivek S. Borkar, Indian Institute of Technology, Bombay
Subject area: Aerospace Engineering, Applied Mathematics

Anoushka Nadeem Syed, University of Wisconsin – Madison
Mentor: Pooja Murada & Lalit Sharma, Institute of Rural Research and Development, Gurgaon
Subject area: Water Sanitation Systems

Athavi Jeevananthan, University of Wisconsin – Madison
Mentor: D. Balasubramanian, L. V. Prasad Eye Institute, Hyderabad
Subject area: Biochemistry

Gokul Pathikonda, University of Illinois, Urbana-Champaign
Mentor: Roddam Narasimha, Jawaharlal Nehru Centre for, Bangalore
Subject area: Aerospace Engineering (Fluid Dynamics)

Back to Contents

Hannah Grace Cherian, University of Michigan, Michigan
Mentor: T.S. Sridhar, St. John's Research Institute, Bangalore
Subject area: Biomedical Engineering

Joshua B Sperling, University of Colorado
Mentor: Siddharth Agarwal, Urban Health Resource Centre, New Delhi
Subject area: Civil & Environmental Engineering

Abhik Seal, Indiana University, Bloomington, Indiana
Mentor: D. Sriram, BITS-Pilani, Hyderabad campus
Subject area: Chemical Informatics

Kyle Christopher Kloepping, University of Iowa
Mentor: Baljinder Singh, Post Graduate institute of Medical Education and Research, Chandigarh
Subject area: Free Radical and Radiation Biology

Sohan Sudhir Kale, University of Illinois, Urbana-Champaign
Mentor: K. Ramesh, Indian Institute of Technology, Madras, Chennai
Subject area: Mechanical Engineering

Pritish Jetley, University of Illinois, Urbana-Champaign
Mentor: Upinder S. Bhalla, National Center for Biological Sciences, Bangalore
Subject area: Computational Science and Parallel Programming

Khorana Program for Scholars

Contact Persons:
Aseem Z. Ansari
Department of Biochemistry
University of Wisconsin-Madison
E-mail: ansari@biochem.wisc.edu

Nishritha Bopana
Indo-US S&T Forum, New Delhi
E-mail: nbopana@indousstf.org

The **Khorana Program for Scholars** is a tripartite arrangement between the Department of Biotechnology, Govt. of India, the University of Wisconsin-Madison [representing partner US Universities], and the Indo-US Science and Technology Forum in order to nurture contacts between students in the field of biotechnology and biomedical sciences from India and the US. The program is named in honor of Dr. Har Gobind Khorana who won the Nobel Prize for his work at the interface of chemistry and biology in 1968 while a member of the UW faculty.

The Khorana Program is a summer internship program for Indian students (currently enrolled in B.Tech., M.Tech. and M.Sc. programs in Biotechnology and allied areas) to undertake a research internship at UW and partner US Universities for a period of 10-12 weeks. Out of a pool of more than 500 applicants each year, 12 students interned under the Khorana program in 2009 and 15 students were selected in 2010 and 2011 respectively.

The Khorana Program is envisaged to:

- Provide encouragement to young scholars to undertake R&D
- Enable students to carry out research at a premier University in the United States
- Transform research into societal benefits
- Build a seamless scientific community between India and the United States

Keeping in mind the success of the program so far and the large pool of quality applicants available, we have expanded the Khorana Program to several premier US Universities (University of Iowa, University of Illinois, University of Michigan, University of Minnesota, Michigan State University, Indiana University, Georgetown University, MIT and University of Wisconsin-Madison) to enable a larger number of students to gain a transformative international experience. In 2012, the following 30 students were selected under this program:

Ahanjit Bhattacharya, Indian Institute of Technology-Kharagpur
Host University: University of Minnesota
Advisor: Mark Distefano
Subject area: Covalent modification of Ciliary Neurotrophic Factor for therapeutic application in neurodegenerative diseases

Anahita Bharadwaj, SASTRA University, Thanjavur
Host University: Georgetown University
Advisor: Makarand Paranjape
Subject area: Production of nanofibers for various biomedical applications

Anirvan Komath Majumdar, Birla Institute of Technology and Science, Pilani
Host University: University of Illinois Urbana-Champaign
Advisor: Elizabeth T. Hsiao-Wecksler
Subject area: PCB design of ankle foot orthotics control circuitry

Aseem Shrivastava, IISER, Bhopal
Host University: Georgetown University
Advisor: Paul Roepe
Subject area: Elucidation of specific amino acid residues in mutated CRT protein which interacts with quinoline antimalarial drugs

Atif Zafar Khan, Aligarh Muslim University
Host University: University of Wisconsin-Madison
Advisor: James Thomson
Subject area: Develop a novel method to study the GFP transcript expression in the presence and absence of long lived genes in mouse and human embryonic stem cells

Chetan Srinath, Indian Institute of Technology-Madras
Host University: Massachusetts Institute of Technology
Advisor: Mandana Sassanfar
Subject area: Identification of enhancers of microRNA/ Argonaute-mediated translational repression

Chinmay Jayesh Shukla, Indian Institute of Technology-Madras
Host University: University of Wisconsin-Madison
Advisor: Aseem Ansari, Parmesh Ramanathan and Jennifer Reed
Subject area: Modeling and regulating metabolic networks using TALEs

Deeksha Jain, Institute of Chemical Technology, Mumbai
Host University: University of Minnesota
Advisor: Ilja Siepmann
Subject area: Effect of blending on solvent properties for solvent-based selective extraction of ethanol from fermentation broths

Deepa Rajagopalan, SASTRA University, Thanjavur
Host University: University of Michigan
Advisor: Ruma Banarjee
Subject area: Interactions between proteins involved in vitamin B12 trafficking

Devanshi Khare, Jawahar Lal Nehru University, New Delhi
Host University: Indiana University
Advisor: Carl Bauer
Subject area: Interaction between the photosensor protein Ppr of Rhodospirillum centenum with CheW3a and CheW3b genes and its role in encystment

Divya Ganapathi Sankaran, Anna University of Technology, Trichy
Host University: Indiana University
Advisor: James Glazier
Subject area: Effects of arsenic exposure on Angiogenesis using Zebrafish intersegmental vessel sprouting as a model

Diya Binoy Joseph, National Institute of Technology, Calicut
Host University: University of Michigan
Advisor: Arul Chinnaiyan and Chandan Kumar
Subject area: Functional characterization of ZNF700-MAST1 fusion protein

Ekta Khetan, Birla Institute of Technology and Science, Pilani
Host University: University of Illinois Urbana-Champaign
Advisor: Matt Wheeler
Subject area: Stem cell culture in microf uidic devices

Faizan Uddin, Aligarh Muslim University
Host University: Michigan State University
Advisor: Syed A. Hashsham
Subject area: Onsite detection of Legionella through a LAMP based point-of-care device using most probable number method

Jithesh Krishnan Ambujam, Indian Institute of Technology-Kharagpur
Host University: University of Wisconsin-Madison
Advisor: Rasmus M Birn and Prof Mary Elizabeth Meyerand
Subject area: Analysis of developmental changes in task based functional connectivity in adolescent brains using fMRI

Kriti Gupta, Indian Institute of Technology-Delhi
Host University: Michigan State University
Advisor: Puliyur Mohankumar and Sheba Mohan Kumar
Subject area: Prenatal programming of obesity

Back to Contents

Mahima Sharma, Dr. B.R. Ambedkar Center for Biomedical Research, University of Delhi
Host University: Michigan State University
Advisor: Puliyur Mohankumar and Sheba Mohan Kumar
Subject area: Role of brain derived neurotrophic factor in anxiety development

Nayan Jain, Indian Institute of Technology-Madras
Host University: University of Wisconsin-Madison
Advisor: Michael Gould
Subject area: Identifying transcription factors that modulate the expression of cancer candidate gene Fbxo10 in a tissue-specific manner

Nivedita Damodaren, A.C. College of Technology, Anna University
Host University: Indiana University
Advisor: Stephen Jacobson
Subject area: Synchronization of the motB mutant of Caulobacter crescentus using microf uidic device

Prasanth Thangachi, A.C. College of Technology, Anna University
Host University: University of Iowa
Advisor: Michael Schultz
Subject area: Small molecules for therapy of metastatic melanoma

Priyadarshini Ravindran, Tamil Nadu Agricultural University, Coimbatore
Host University: Indiana University
Advisor: Cheng Kao
Subject area: Detection and characterization of viruses from common salad greens

Rishi Dua, Indian Institute of Technology-Delhi
Host University: University of Wisconsin-Madison
Advisor: Aseem Ansari
Subject area: Developing tools for automating data analysis and data mining specifically involving experiments related to bZIP domain

Ruchi Kumari, All India Institute of Medical Sciences, New Delhi
Host University: Georgetown University
Advisor: Steven Singer
Subject area: Immune regulation of cell proliferation in giardiasis

Sachin Sethi, Birla Institute of Technology and Science, Pilani
Host University: Indiana University
Advisor: Andrew Zelhof
Subject area: Evolutionary developmental analysis of ciliary opsins

Sai Deepikaa Elumalai, Anna University, Chennai
Host University: University of Iowa
Advisor: Kris De Mali
Subject area: Identifying the signal transduction pathways regulating ZO-1 binding to α-catenin

Samata Chaudhuri, Indian Institute of Technology-Kharagpur
Host University: University of Michigan
Advisor: Sofia Merajver
Subject area: Characterization of differentiated macrophage by M1/M2 gene profile and the expression of RhoC in IBC-derived cells stimulated with macrophage conditioned media

Saumya Tiwari, Indian Institute of Technology-Roorkee
Host University: University of Illionis Urbana-Champaign
Advisor: Rohit Bhargava
Subject area: Role of degraded collagen on epithelial to mesenchymal transition of MCF-7 breast cancer cells

Seep, Indian Institute of Technology-Bombay
Host University: University of Michigan
Advisor: Keith E. Cook
Subject area: Antibacterial perf uorocarbon ventilation

Shashank Shekhar, Indian Institute of Technology-Guwahati
Host University: University of Wisconsin-Madison
Advisor: Brian Pf eger
Subject area: Systems and synthetic biology

Shruthy Suresh, Indian Institute of Technology-Madras
Host University: Michigan State University
Advisor: Christina Chan
Subject area: Expression and production of un-phosphorylated IRE1-CD protein using lambda phosphatase

Siddhant Jain, Indian Institute of Technology-Roorkee
Host University: University of Illinois Urbana-Champaign
Advisor: Matt Wheeler
Subject area: Porcine Adipose-Derived Stem Cells Differentiates into myotubes when Co-Cultured with C2C12 Cells

Sindhuja Rajasekaran, A.C. College of Technology, Anna University, Chennai
Host University: University of Michigan
Advisor: Arul Chinnaiyan and Chandan Kumar
Subject area: Characterization of SPOP-VRK2 fusion in prostate cancer

Somya Agarwal, Banaras Hindu University, Varanasi
Host University: Michigan State University
Advisor: Jayaraman
Subject area: Nanotechnology, synthesis of catalysts, f uid dynamics

Sukriti, Indian Institute of Technology-Delhi
Host University: Massachusetts Institute of Technology
Advisor: Mandana Sassanfar
Subject area: Identification of genes involved in melanoma metastasis and chemotherapeutic resistance using RNAi

Susmitha Purnima Kotu, Indian Institute of Technology-Gandhinagar
Host University: University of Iowa
Advisor: Miles Pufall
Subject area: Role of TXNIP as a vital gene in leukemia treatment sensitivity

Swati Varshney, Aligarh Muslim University
Host University: Indiana University
Advisor: Lingling Chen
Subject area: Histone proteins

Back to Contents

The students visited the US Host Universities mid-May to end-July 2012. After their internship, the **Khorana Program Student Symposium** held on 3rd August 2012 at India International Center, New Delhi, invited the scholars to share their research experiences with top policy makers and innovation leaders, faculty mentors, program administrators and other Khorana scholars. The Keynote speaker **Sam Pitroda**, advisor to the Prime Minister on Public Information Infrastructure and Innovations, spoke on the importance of nurturing young talent. He urged the Khorana Scholars to break traditional constraints on thought and follow their dreams by charting their unique paths to success and live up to the legacy of Prof. Khorana. The Secretary of the Department of Biotechnology, Govt. of India, **M.K. Bhan**, presided over the function and together with Sam Pitroda distributed certificates and medals to the 2012 Khorana Scholars. The co-founders, **Kenneth Shapiro** and **Aseem Ansari**, added that the program's true impact will be felt in a generation as scholars make significant contributions to science and society. Executive Director of IUSSTF, **Rajiv Sharma**, noted that the program honored the true spirit of collaboration and partnership between India and the United States.

Khorana Program: Technology Transfer Course

Contact Persons:
Shailja Gupta
Department of Biotechnology,
Govt. of India
E-mail:
shailja@dbt.nic.in

Aseem Z. Ansari
Department of Biochemistry
University of Wisconsin-Madison
E-mail:
ansari@biochem.wisc.edu

Nishritha Bopana
Indo-US S&T Forum,
New Delhi
E-mail:
nbopana@indousstf.org

The Department of Biotechnology (DBT), Govt. of India, University of Wisconsin-Madison (UW) and the Indo-US Science and Technology Forum (IUSSTF) partnered to support the **Technology Transfer Course** under the aegis of the prestigious Khorana Program named in honor of Dr. Har Gobind Khorana, who won the Nobel Prize in 1968 for his work at the interface of Chemistry and Biology while a member of the UW faculty.

The Technology Transfer Course is specially designed as an intensive two-week program at UW-Madison, aimed to provide participants with significant insight into managing technology in its journey from the laboratory to the marketplace through a series of pedagogical lectures, round table discussions, case studies, and site visits. The course would include some of the following specific aspects: structuring the research environment to facilitate commercialization while at the same time not compromising the scientific process; entrepreneurship business education; management of conflict of interest; patenting – disclosure, screening, filing and defending patents; marketing and licensing new technologies; venture capital – raising funds, selecting investments, mentoring new companies, etc.

The following 12 candidates participated in the Technology Transfer Course in 2012:

Anil Kumar, National Institute of Immunology, New Delhi

Bharathi Paramahans Salimath, University of Mysore, Kalaivani Ganesan, Department of Biotechnology, Ministry of Science & Technology, New Delhi

Krishna Jyoti Mukherjee, School of Biotechnology, Jawaharlal Nehru University, New Delhi

Manoj Kumar Bhat, National Centre for Cell Science, Pune

Navin Chandra Khanna, International Centre for Genetic Engineering and Biotechnology, New Delhi

Back to Contents

Onkar Nath Tiwari, Department of Biotechnology, Ministry of Science & Technology, New Delhi

Sadhana Srivastava, Indian Council of Medical Research, New Delhi

Rajneesh Kumar, Biotechnology Industry Assistance Council (BIRAC), New Delhi

Sanyukta Sen Gupta, National Institute of Immunology, New Delhi

Rakesh Kumar Khandwaha, Indian Institute of Science Education and Research, Mohali

Vineet Kumar Sharma, Indian Institute of Science Education and Research (IISER) Bhopal

S.N. Bose Scholars Program

Contact Person:
Aseem Z. Ansari
Department of Biochemistry
University of Wisconsin-Madison
E-mail: ansari@biochem.wisc.edu

Nishritha Bopana
Indo-US S&T Forum,
New Delhi
E-mail: nbopana@indousstf.org

To address the need for human resource development and capacity building in science and technology, the Department of Science and Technology, Govt. of India, the Indo-US Science and Technology Forum (IUSSTF) and the University of Wisconsin-Madison have partnered to develop a dynamic student exchange program between Indian institutions and premier US Universities led by the University of Wisconsin at Madison. This program is named the **S.N. Bose Scholars Program** after the late Prof. Satyendra Nath Bose, a visionary Indian physicist best known for his work on quantum mechanics in the early 1920s, providing the foundation for Bose–Einstein statistics and the theory of the Bose–Einstein condensate. A Fellow of the Royal Society, he was awarded India's second highest civilian award, the Padma Vibhushan in 1954 by the Government of India. He made important contributions to the field of quantum physics in the 1920s that changed how particle physics has been studied ever since. The class of particles that obey Bose-Einstein statistics, Bosons, was named after him. The inception of this program would be particularly opportune as it would coincide with the discovery of the Higgs-Boson earlier this year at the Large Hadron Collider at CERN in Switzerland. It would honor an Indian scientist's fundamental contribution to the completion of the Standard Model of the Universe.

The S.N. Bose Scholars Program will provide an opportunity to Indian and US students (enrolled in Bachelors and Masters programs in Atmospheric and Earth Sciences; Chemical Sciences; Engineering Sciences; Mathematical and Computational Sciences; and, Physical Sciences.) to undertake a research internship each summer for a period of 10-12 weeks in each other's countries.

The broad objectives of the program are:

- Provide an opportunity to best and brightest Indian students to gain exposure and access to world class research facilities in US academia and labs;
- Promote research and capacity building in frontline areas of science and technology;
- Encourage and motivate outstanding students to take up research as a career path;
- Pave the way for the next generation scientists and technologists from India to interact at an equal footing with American peers, thus helping to build long-term R&D linkages and collaborations; and,
- Bring talented American students to research laboratories in India to build a deeper appreciation of the culture of innovation and long-standing tradition of scientific enquiry in India.

In 2013, the following **42 Indian students** were selected under this program:

Abhinav Gupta, Indian Institute of Technology-Kharagpur
Host University: Georgetown University
Advisor: Miklos Kertesz
Subject area: Study of pi-stacking interactions between dimers and validate theoretical data with experimental results using CSD and apply modeling to novel molecules.

Abhiram Ravi, Indian Institute of Technology-Madras
Host University: University of Wisconsin- Madison
Advisor: Paramesh Ramanathan
Subject area: Distributed multiplayer games in virtual reality and ultrafast networks

Advait Ashutosh Hasabnis, Indian Institute of Technology-Bombay
Host University: University of Wisconsin-Madison
Advisor: Sundaram Gunasekaran
Subject area: Biological systems engineering

Ameya Dhananjay Patil, Indian Institute of Technology-Hyderabad
Host University: University of Illinois at Urbana-Champaign
Advisor: Yih-Kuen Jan
Subject area: Signal processing, algorithm development for driving pattern quality assessment

Anwesha Mukherjee, Indian Institute of Technology-Guwahati
Host University: University of Minnesota
Advisor: Andreas Stein
Subject area: Synthesis of porous electrode materials for rechargeable lithium-ion batteries

Bibek Ranjan Samanta, Indian Institutes of Science Education and Research-Kolkata
Host University: Georgetown University
Advisor: Richard Weiss
Subject area: Synthesis and characterization of anthracene-based gels by photochemistry and rheology

Debarati Banerjee, VIT University, Chennai
Host University: University of Michigan
Advisor: Andrew DeOrio
Subject area: Using machine learning for post silicon bug diagnosis

Harshal Priyadarshi, Indian Institute of Technology-Roorkee
Host University: University of Wisconsin- Madison
Advisor: Giri Venkatraman
Subject area: Use of wireless sensor network technologies to effect energy savings across the electricity board

Harshika Singh, National Institute of Technology, Rourkela
Host University: University of Wisconsin- Madison
Advisor: Giri Venkatraman
Subject area: Power/energy sustainability

Harshit Agrawal, Indian Institute of Technology-Guwahati
Host University: Massachusetts Institute of Technology
Advisor: Pattie Maes
Subject area: Fluid interfaces / human computer interaction

Kanan Hemantkumar Patel, Indian Institute of Technology-Madras
Host University: University of Wisconsin- Madison
Advisor: Parmeswaran Ramanathan/ Aseem Ansari
Subject area: Genome modeling

Karandeep Singh, Indian Institutes of Science Education and Research-Mohali
Host University: University of Michigan
Advisor: Karunesh Arora
Subject area: Biophysics

Karthik Abhinav S., Indian Institute of Technology-Madras
Host University: University of Michigan
Advisor: Stephane LaFortune
Subject area: Opacity in discrete event systems (DES)

Krishna Shrinivas, Indian Institute of Technology (IIT) Madras
Host University: University of Wisconsin- Madison
Advisor: Aseem Ansari, Parmesh Ramanathan, Jennifer Reed
Subject area: Computational metabolic and genomic engineering

Krishna Dwaipayana Bharadwaj Anapindi, Indian Institute of Technology-Kharagpur
Host University: University of Wisconsin- Madison
Advisor: Michael D. Graham
Subject area: Chemistry

Kumar Ashish, Indian Institute of Technology-Kharagpur
Host University: University of Wisconsin Madison
Advisor: Sanjay. Sanjay Limaye
Subject area: Flying platforms on Venus

Manu Agarwal, Indian Institute of Technology-Jodhpur
Host University: University of Wisconsin- Madison
Advisor: Ramesh Ramananthan
Subject area: Developing a genome fabrication language

Mayukh Bhadra, Indian Institute of Technology-Bombay
Host University: Georgetown University
Advisor: Timothy Warren
Subject area: Cu (1) complexes and their roles in catalysis

Back to Contents

Meera Ramaswamy, Indian Institute of Technology-Bombay
Host University: University of Wisconsin- Madison
Advisor: Mark Rzchowski
Subject area: Characterization of pnictide thin films using transport measurements

Mofeez Alam, Indian Institute of Space Technology, Trivandrum
Host University: University of Wisconsin- Madison
Advisor: Sanjay Limaye
Subject area: Sciences/ Aerospace Engineering

Mubeena Fatima, Indian Institute of Technology-Bhubaneswar
Host University: University of Wisconsin- Madison
Advisor: Gustavo Parra Montesinos
Subject area: Use of fiber-reinforced concrete in structural applications

Nishant Jayant Udgaonkar, Fergusson College, Pune
Host University: University of Wisconsin- Madison
Advisor: Sanjay Limaye
Subject area: Space science - Design of a f oating platform on Venus, analysis of data from Venus explorer

Oindrila Manna, Parent Institution: Indian Institute of Technology-Madras
Host University: Massachusetts Institute of Technology
Advisor: Gareth H. McKinley
Subject area: Superhydrophobicity, Slip surfaces

Praneeth Syamal Chilakalapudi, University of Hyderabad
Host University: University of Wisconsin- Madison
Advisor: Sridhara Rao Dasu
Subject area: High Energy Physics

Prateek Garg, University of Mumbai & Department of Atomic Energy, Centre for Excellence in Basic Sciences, University of Mumbai
Host University: Michigan State University
Advisor: Chris Waters
Subject area: Bacterial biofilms

Saba Suhail, Indian Institute of Technology-Jodhpur
Host University: University of Wisconsin- Madison
Advisor: Giri Venkatraman
Subject area: Energy sustainability in wireless power sensors

Saikrishna Badrinarayanan, Indian Institute of Technology-Madras
Host University: University of Illinois at Urbana-Champaign
Advisor: Manoj Prabhakaran
Subject area: Predicate encryption

Salini Karuvade, Indian Institute of Science Education and Research-Trivandrum
Host University: University of Wisconsin- Madison
Advisor: Mark Saffman and Robert McDermott
Subject area: Quantum information and computation

Saparya Chattaraj, Indian Institute of Technology-Kharagpur
Host University: University of Minnesota
Advisor: Ilja Siepmann
Subject area: Study of adsorption of alcohol, water and their mixtures (different proportions) on zeolites using computer simulations

Sarang Sunil Nath, Indian Institute of Technology-Delhi
Host University: University of Wisconsin- Madison
Advisor: Parmesh Ramanathan
Subject area: Computational metabolic engineering

Shilpa Garg, Indian Institute of Information and Technology-Delhi
Host University: University of Wisconsin- Madison
Advisor: Parmesh Ramanathan and Aseem Ansari
Subject area: Development of automation tools for genome modeling

Sooryanarayanan Gopalakrishnan, Indian Institute of Technology-Madras
Host University: University of Wisconsin- Madison
Advisor: Parmesh Ramanathan
Subject area: Automation tools to describe a desired biological function in a high-level language and synthesize the genome architecture to realize that function

Soubhik Kumar, Indian Institutes of Science Education and Research-Kolkata
Host University: University of Wisconsin- Madison
Advisor: Sridhara Dasu
Subject area: High Energy Physics

Souransu Nandi, National institute of Technology-Durgapur
Host University: University of Illinois at Urbana-Champaign
Advisor: Elizabeth T. Hsiao-Wecksler
Subject area: Development and fabrication of PCB board for different controllers of powered orthosis

Subhasree Kal, Indian Institute of Technology-Kanpur
Host University: University of Minnesota
Advisor: Lawrence Que Jr.
Subject area: Study of the coordination of Iron in the active site of deoxyhypusine hydroxylase

Sujoy Saha, Indian Institute of Technology-Patna
Host University: University of Wisconsin- Madison
Advisor: Parmesh Ramanathan
Subject area: Chemical and metabolic engineering

Sumit Gupta, Indian Institute of Technology-Kanpur
Host University: University of Michigan
Advisor: Jianping Fu
Subject area: Isolation and Immuno- phenotyping of subpopulations of immune cells

Back to Contents

Tushita Goyal, Indian Institute of Technology-Banaras Hindu University
Host University: University of Wisconsin- Madison
Advisor: Thatcher Root
Subject area: To study gold-palladium catalyst supported on alumina for the preparation of aldehydes by oxidation of alcohols.

Vikas Jaiswal, Indian Institute of Technology-Guwahati
Host University: University of Wisconsin- Madison
Advisor: Dong Gee Hong
Subject area: Design and fabrication of next generation mask less array synthesizer

Vivek Ramachandran Ravi, Indian Institute of Technology-Roorkee
Host University: University of Wisconsin- Madison
Advisor: Parmesh Ramanathan
Subject area: Computational metabolic engineering and genomic modeling

Yamini Thadisina, Indian Institute of Technology-Patna
Host University: University of Wisconsin- Madison
Advisor: Parmeshwaran Ramanathan
Subject area: Computer Science and Engineering

In 2013, the following 13 US students were selected under this program:

Anmol Vittal Chavan, Purdue University, West Lafayette
Host University: Indian Institute of Science, Bangalore
Advisor: Bharadwaj Amrutur
Subject area: Delay cell chain implementation on FPGA using VHDL

Benjamin David Forster, University of Michigan-Ann Arbor
Host University: Indian Institutes of Science Education and Research (IISER) Pune
Advisor: Manickam Jayakannan
Subject area: Polymer-based drug delivery

Christopher Marc Montagne, Arizona State University, Phoenix
Host University: National Centre for Biological Sciences
Advisor: Praveen Kumar Vemula
Subject area: Biomedical Engineering

Jason L Guo, Northwestern University, Evanston
Host University: Indian Institute of Technology-Bombay
Advisor: Chandra Venkataraman
Subject area: Aerosol synthesis of surface stabilized nanoparticles for drug delivery

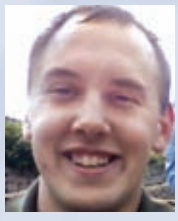
Jerdon William Dresel, University of Wisconsin-Madison
Host University: Indian Institutes of Science Education and Research-Pune
Advisor: L.S. Shashidhara
Subject area: Wing and haltere formation in Drosophila melanogaster

Juana Vargas, New York University, New York
Host University: National Centre for Cell Science, Pune
Advisor: Shekhar Mande
Subject area: How the Wnt/B-Catenin pathway inf uences the modification of SMAR1 and translocation to the nucleus.

Melanie Rae Swannell, University of Wisconsin-Madison
Host University: National Centre for Cell Science, Pune
Advisor: Shekhar Mande
Subject area: GroEL chaperonin protein in Mycobacterium tuberculosis

Nicholas Joseph Rettko, University of Wisconsin-Madison
Host University: National AIDS Research Institute (NARI), Pune
Advisor: R.S. Paranjape
Subject area: Chemical Sciences

Nicole Teresa Mihelich, University of Wisconsin-Madison
Host University: National Center for Biological Sciences-Bangalore
Advisor: Shravanti Rampalli-Deshpande
Subject area: Epigenetic regulation of somatic and stem cell plasticity



Phillip Edward Splettstoeszer, University of Wisconsin-Madison
Host University: Indian Institute of Technology-Hyderabad
Advisor: Anjan Kumar Giri
Subject area: Particle physics, neutrino oscillations

Siddharth Kumar Iyengar, New York University, New York
Host University: National AIDS Research Institute, Pune
Advisor: Sheela Godbole
Subject area: HIV/AIDS epidemiology

Back to Contents

Viterbi – India Program

Contact Persons:
Cauligi Raghavendra
USC Viterbi School of Engineering
University of Southern California
E-mail: raghu@vsoe.usc.edu

Nishritha Bopana
Indo-US S&T Forum, New Delhi
E-mail: nbopana@indousstf.org

An important aspect of engineering education in the 21st century is to provide the experience of international research to young scholars and a practical way to achieve this would be to foster their participation in international research programs. Such initiatives would offer them an array of experiences both academic and social that would help them gain a global perspective and prove invaluable in their professional careers through a cross-cultural exposure. To address this need for human resource development and capacity building in the field of computer sciences and electrical engineering, IUSSTF and the Viterbi School of Engineering at the University of Southern California partnered to support the **Viterbi-India Program** between Indian institutions and the Viterbi School of Engineering.

Under the **Viterbi-India Program**, each summer for the last two years, 10 students from top Indian Institutions were hosted at USC for summer research. The goals were to provide an excellent opportunity for scholars to encourage them to pursue research, interact with students from all over the world, and foster education and research collaborations with students and faculty between US and India. Both students from Indian institutions and USC faculty participating in this program have expressed strong sentiments about how this program has been valuable to all concerned stakeholders. The Indian students who came to USC were typically toppers from high-ranking Institutions in India and were able to conduct outstanding research in a short amount of time. **Keeping in view the success of the program thus far and the interest it has created among Indian students in just two years; the program has been extended and expanded to enable a larger number of Indian students to gain a transformative international experience which is expected to also provide the motivation to pursue scientific careers.** This would be accomplished by allowing students (pursuing Computer Sciences, Electrical Engineering and Computational Sciences) from any recognized Indian Institution to compete for the 20 internships available each year.

The following twenty outstanding students were selected for the program year 2013:

Agrim Gupta, Birla Institute of Technology & Science-Pilani
Mentor: Viktor Prasanna

Ayush Jaiswal, National Institute of Technology-Calicut
Mentor: Craig Knoblock

Anindya Lal Roy, Indian Institute of Technology-Kharagpur
Mentor: Chongwu Zhou

Bharath V., National Institute of Technology Karnataka-Surathkal
Mentor: Kirk Shung

Himanshu Jain, Birla Institute of Technology & Science (BITS) - Pilani
Mentor: Gerard Medioni

Debarghya Sarkar, Jadavpur University, Kolkata
Mentor: Michelle Povinelli

Aswin Suresh, Indian Institute of Technology-Rajasthan
Mentor: Anupam Madhukar

Deepak Garg, Indian Institute of Technology-Ropar
Mentor: Kristina Lerman/Aram Galstyan

Back to Contents

Kaviya Rawat, Indian Institute of Technology-Ropar
Mentor: Alice Parker

Nikita Juneja, Indraprastha Institute of Information Technology-Delhi
Mentor: Gaurav Sukhatme

Nishit Malde, Birla Institute of Technology & Science-Pilani, Hyderabad Campus
Mentor: Shri Narayana

Nitish Kumar Srivastava, Indian Institute of Technology-Kanpur
Mentor: Peter Beerel

Prashant Garg, Indian Institute of Technology-Delhi
Mentor: Daniel Dapkus

Rasiga Gowrisankar, College of Engineering, Guindy
Mentor: David Traum/Anton Leuski

Satwik Kottur, Indian Institute of Technology-Bombay
Mentor: Gerard Medioni

Siddhartha Sarkar, Indian Institute of Technology-Khargpur
Mentor: Hossein Hashemi

Sri Vaishnavi S. Gomatham, Indian Institute of Technology-Madras
Mentor: Ellis Meng

Sudarshan Srinivasan, Indian Institute of Technology-Hyderabad
Mentor: Ewa Deelman

Varun Sah, Birla Institute of Technology & Science-Pilani
Mentor: Rahul Jain

Vignesh Babu, Indian Institute of Technology-Guwahati
Mentor: Bhaksar Krishnamachari

Indo-US Public Health Fellowships

Contact Person:
Smriti Trikha
Indo-US S&T Forum, New Delhi
E-mail: strikha@indousstf.org

In an effort to augment scientific excellence in the area of public health, the Indo-US Science and Technology Forum (IUSSTF) in partnership with the Public Health Foundation of India launched the Indo-US Public Health Fellowships program supported by the Science and Engineering Research Board (SERB), Government of India. The objective of this program is to promote research and capacity building in the crucial area of public health. It is envisaged that these fellowships will help strengthen and expand the knowledge base of Indian public health research and education.

This prestigious fellowship scheme was formally launched in March 2012. The fellowship encourages young and mid-career scientists to interact with the international public health community and build long-term sustainable linkages. The fellowships provides opportunity to the awardees to spend between 3 to 12 months in any premier host institution in USA. The fellowship covers a monthly stipend, return air-fare, preparatory allowances, conference allowances, etc.

Researchers from academia and laboratories chosen for the 2012 awards were:

Bijay Kumar Rout, Birla Institue of Technology and Science , Pilani
US Host: Ferdinando (Sandro) Mussa-Ivaldi, Northwestern University, Chicago
Subject area: Design and development of an integrated system for the upper limb rehabilitation

Josyula K. Lakshmi, Indian Institute of Public Health, Hyderabad
US Host: Anne Newman, University of Pittsburgh, Pittsburgh
Subject area: Health promotion; physical activity and aging

Nomesh B. Bolia, Indian Institute of Technology, New Delhi
US Host: Vidyadhar G. Kulkarni, University of North Carolina (UNC), Chapel Hill
Subject area: Development of scheduling methods for diagnostics equipment

Rahul Diliprao Suryawanshi, Indian Veterinary Research Institute, Bareilly
US Host: Bhushan M. Jayarao, Penn State-Pennsylvania Animal Diagnostic Laboratory
Subject area: Development of diagnostic assays for detection of pathogenic L. manocytogenes

Back to Contents

BILATERAL WORKSHOPS

Accelerating Botanicals and Biologics Agent Development Research for Cancer Chemoprevention, Treatment and Survival

29-31 May 2012, Tampa, Florida, USA

Principal Investigators:
Medha Dhurandhar
Centre for Development of Advanced Computing, Pune
E-mail: medha@cdac.in

Nagi B. Kumar
Moffitt Research Center, Tampa
Email: nagi.kumar@moffitt.org

From ancient times, botanical and biologic agents have been used to treat/prevent several diseases, including cancer. Research has demonstrated that these agents affect a number of proteins involved in various molecular pathways that regulate inf ammatory and carcinogenic responses, various enzymes, transcription factors, receptors, and adhesion proteins. However, though several of these agents have shown efficacy in laboratory and preclinical studies, very few have moved from the bench to the bedside.

The Indo-US Workshop on **Accelerating botanicals and biologics agent development research for cancer chemoprevention, treatment and survival** was organized to bring together trans-disciplinary stakeholders represented by research scientists and clinical oncologists, pharmaceutical industry, regulatory bodies, biotechnology industry representatives and bio-informatics professionals in the two countries to exchange expertise, ideas and resources; and, identify gaps, challenges and solutions to ultimately develop strategies to achieve efficient translation of these discoveries into the standards for clinical practice that will ultimately impact cancer morbidity and mortality.

At the end of the workshop, five collaborative working groups focused on the major cancers affecting both the US and India were formed as follows:

- *Curcumin for ovarian and breast cancer prevention* (Madhuri Kakarala, University of Michigan, Patricia Hudson, Moffitt Cancer Center, Tampa and Devarajan Karunagaran, IIT, Chennai)
- *Decursin, a novel coumarin compound for chemoprevention of prostate cancer* (Omer Kucuk, MD Anderson, Fazul Sarkar, Karnamos Cancer Center, Nagi Kumar, Moffitt Cancer Center, Rana P. Singh, Central University of Gujarat, and Lalit Kumar, All India Institute of Medical Sciences, New Delhi)
- *Limonoids for colorectal cancer chemoprevention* (Mokenge Malafa, Moffitt Cancer Center, Tampa, Shrikant Anant, University of Kansas and Devarajan Karunagaran, Indian Institute of Technology-Madras)
- *Curcumin analogs for chemoprevention of Lung and oral cancer* (Maqsood Siddiqi, Cancer Foundation, India, Bharat Aggarwal, The University of Texas - M. D. Anderson Cancer Center, Nagi Kumar, Moffitt Cancer Center, Tampa, Devarajan Karunagaran, Indian Institute of Technology-Madras and Lalit Kumar, All India Institute of Medical Sciences, New Delhi)
- *Development of a joint repository of botanical and biologics database* (Medha Dhurandhar, C-DA-Pune, Jayaram, Indian Institute of Technology-Delhi and Nagi Kumar, Moffitt Cancer Center, Tampa).

SERC School in Chronobiology

20 June - 3 July 2012, Shillong, India

Principal Investigators:
A. S. Dixit
North Eastern Hill University, Shillong
Email: asdixitnehu@rediffmail.com

Vinod Kumar
University of Delhi, New Delhi
Email: drvkumar11@yahoo.com

Chronobiology intends to understand and leverage oscillatory phenomena in living organisms and their adaptation to geophysical cycles. Over the last three decades it is becoming increasingly clear that complex biological systems integrate signalling, transcription, energy management and metabolite turnover along a 24-hour time scale. Leveraging the temporal controls holds untapped potential to address emerging challenges in areas ranging from food production, ecosystem restoration, to management of non-communicable chronic diseases. Hence chronobiology offers an ideal framework for integrative biology and it encompasses diverse fields including but not limited to comparative anatomy, development, physiology, medicine, genetics, molecular biology, behavior, ecology and evolution. To develop human resources and train a new breed of scientists on the integrative nature of chronobiology, the **SERC School on Chronobiology** was organized as a 15-day event that provided intense training to young investigators and students who have chosen Chronobiology as their field of enquiry.

The topics covered included basic concepts and methods (organization of central nervous system in invertebrates and vertebrates, neurotransmitters, transcription and translation, feedback mechanisms, formal properties of the clock vis-à-vis physical principles, deep sequencing, genomics etc.); understanding what constitutes the clock, and how the clock functions at molecular, cellular, organ, system and whole organism levels; and, the role of circadian organization in humans, implications of circadian disruption in diseases involving sleep, metabolism and aging.

Technology Commercialization through Public-Private Sector Partnerships

8-14 July 2012, East Lansing, USA

Principal Investigators:
Ram Srivastava
CCS Haryana Agricultural University, Hisar
Email: rb_sri@rediffmail.com

Karim M. Maredia
Michigan State University, East Lansing
E-mail: kmaredia@msu.edu

Suresh Kumar Kunhikannan
Technology Information, Forecasting and Assessment Council (TIFAC), Department of Science and Technology, New Delhi
Email: sureshkk@tifac.org.in

Callista Ransom
Michigan State University, East Lansing
E-mail: ransomca@msu.edu

Public institutions in India and the US are generating numerous potential inventions and technologies that could benefit society in terms of enhancing food and nutritional security, environmental quality, and economic growth. Since the implementation of the Bayh-Dole Act during late eighties and early nineties, public sector institutions in the United States have accumulated a wealth of experience in the technology innovation chain including technology transfer, management, and commercialization, formation of start-up companies and evolve models for public-private sector partnerships. Recent initiatives in India, including setting up of Business Plant Development (BPD) units in some ICAR research institutions and a few State Agricultural Units (SAUs), have resulted in gaining experience and insights in the technology commercialization arena in the agricultural sector.

An Indo-US workshop on **Technology Commercialization through Public-Private Sector partnerships** was organized in Michigan State University to bring together technology managers and practitioners from public and private sector institutions in India and the US with the objective of sharing experiences, policy initiatives and imperatives, best practices, and lessons learned in technology commercialisation with emphasis on agricultural sector. Expected outcomes included future collaborations and evolve an effective international technology commercialization resource network.

The workshop focussed on sharing experiences of US Land Grant Universities, the USDA Agricultural Research Service (USDA-ARS), the technology managers from ICAR and SAUs and private sector institutions in India for mutual benefits. The workshop included field visits, case studies, business plan development, technology valuation, licensing, negotiation skills, and development of a roadmap for technology commercialization. The participants also undertook real-world case studies from their own institutions, companies, and regions that have

commercial potential to develop a business plan for product commercialization and deployment. In a few cases involving public and private sector partners were paired to jointly develop a business plan with the idea of forming working relationships that will continue beyond the workshop.

Several new developments were shared from both the US and Indian sides, viz. MSU-Technologies, Spartan Innovations and Business-CONNECT at Michigan State University, USA; TechTown, Wayne State University, USA; Business Planning and Development Units at CCS Haryana Agricultural University and Anand Agricultural University, India; Agri-Science Park at ICRISAT, India; and the Biotech Park for Women, Chennai, India, to name a few. One of the major recommendations from the event was that the group produces a joint book, tentatively entitled 'Technology Transfer and Commercialization, Experiences of India and USA.'

Back to Contents

Space Situational Awareness, Space Weather and Debris Research

19-20 July 2012, Mysore, India

Principal Investigators:
Siraj Hasan
Indian Institute of Astrophysics, Bangalore
Email: hasan@iiap.res.in

Rengasamy Ponnappan
Air Force Office of Scientific Research, Arlington
Email: rengasamy.ponnappan@afosr.af.mil




The Indo-US workshop on **Space situational awareness, space weather and debris research** was aimed to address and brainstorm future directions the research community needs to take in finding innovative scientific solutions for the global issues on space situational awareness including space debris. The areas of discussion included advances in ground- and space-based surveillance and tracking; in-situ measurement techniques; debris and meteoroid environment models; debris f ux and collision risk for space missions; on-orbit collision avoidance; re-entry risk assessments; debris mitigation and debris environment remediation techniques and their effectiveness with regard to long-term environment stability; national and international debris mitigation standards and guidelines; hypervelocity impact technologies; on-orbit shielding concepts plus dynamical interaction and modeling of vehicles to develop a full 6-DOF theory of space vehicles and orbit debris; methods for accurate and precise recovery and prediction of space object; improved abilities for predicting collisions; and, advanced computational and visualization methods.

The following research topics are recommended by the attendees for future research: space weather (space weather forecast, orbit propagation, real time data processing, precise orbit determination, long term solar activity projection and space weather-satellite); space debris SD (active debris removal, re-entry, measurement, debris induced chemistry, mitigation of space debris, development of numerical modeling, hypervelocity impact effects on satellite components, fragmentation models, collision avoidance, effects of plasma environment on SD, exploiting plasma properties for SD mitigation, accuracy and reliability of measurement data and realistic simulation modeling of fragmentation processes); and, space situational awareness (observations, high area-to-mass-ratio objects catalogue, space education outreach, algorithms for surveillance and tracking, international collaboration, experimental opportunities and data fusion).

"Triple Trouble": Malnutrition, Tuberculosis and HIV in India

3-5 August 2012, Chennai, India

Principal Investigators:
Soumya Swaminathan
National Institute for Research in Tuberculosis, Chennai
Email: doctorsoumya@yahoo.com

Christine A. Wanke
Tufts University, Boston
Email: christine.wanke@tufts.edu

In a setting where HIV infection and tuberculosis (TB) are operating in a population characterized by poverty and malnutrition, there is a greater need to focus on nutrition in individuals with HIV infection or with both HIV infection and TB. Policy makers in resource-poor regions need information on both the efficacy and feasibility of providing nutritional supplements (of various types) in different settings. Although there have been many calls for integration of HIV and nutrition programs, data is lacking on how such programs can be implemented in resource-constrained settings, what the composition of the supplement should be, and which subgroups should be targeted. The Indo-US workshop titled "Triple trouble": malnutrition, tuberculosis and HIV in India was organized with the following objectives: to review existing data on HIV infection, tuberculosis and malnutrition in India and to identify research gaps; to develop concept notes for future research and identify areas for potential collaboration between India and US partners on HIV-TB and nutrition; and, to develop recommendations on nutrition for HIV and TB, focusing on the acceptability, effectiveness and feasibility of nutritional supplementation in India.

The major recommendations that were made at the end of the workshop included the following:

- India needs region specific data on nutritional status of HIV-infected individuals and TB patients, which should serve as advocacy tool for policy makers.
- A full range of interventions should be used to meet the macro and micronutrient requirements of these patients, including nutrition counselling.
- Both local and international agencies should allocate a part of their budget for nutrition support and care for HIV-infected and TB patients
- India should develop a comprehensive plan of action for nutrition support of TB and HIV affected persons, along with all partners like NACO, Central TB Division and Nutrition Society of India, in a well coordinated way to avoid duplication of efforts.

Flame Stabilization And Combustion Stability

6-8 August 2012, Chennai, India

Principal Investigators:
S. R. Chakravarthy
Indian Institute of Technology-Madras
Email: src@ae.iitm.ac.in

S. K. Aggarwal
University of Illinois at Chicago, Chicago
Email: ska@uic.edu

T. M. Muruganandam
Indian Institute of Technology-Madras
Email: murgi@ae.iitm.ac.in

T. C. Lieuwen
Georgia Institute of Technology, Atlanta
Email: tim.lieuwen@aerospace.gatech.edu

Flame stabilization and combustion stability is an area of active research interest and industry focus in both India and the United States. With this in mind organized an Indo-US workshop on **Flame Stabilisation and Combustion Stability** to bring together researchers from both academic/ research institutions and the industry of the two countries. The key topics covered at the workshop included: modeling combustion instability – role of nonlinearity and non-normality; dynamical systems approach to flame stabilization and combustion stability – bifurcations and chaos; experimental database and characterization on f ame stabilization and combustion stability; study of f ame stabilization and combustion stability in practical energy systems using biofuels or syngas; role of chemical kinetics of biofuels/syngas in dynamic f ame stabilization; receptivity of flame-stabilizing shear layers to acoustic oscillations; aero-thermo-acoustic sources from bluff-body/swirl-stabilized combusting f ows in practical burner devices; role of oscillatory liquid fuel spray injection and its response to acoustic oscillations; practical events of combustion instability and flame de-stabilization, and approaches to combat them; active and passive control approaches to f ame stabilization and combustion stability; and, impact of control strategies on pollutant emissions.

Novel ideas/methodologies presented at the event included: Multiple time scales approach for solving flame-flow-acoustics interactions using CFD; Dynamic Mode Decomposition (DMD) used for analyzing the dominant modes of the oscillations near loss of stability; Multiple experimental approaches like simultaneous stereo-PIV, PLIF to study the flow field during the dynamical events; Multiple sensors and mode shape analysis to deduce the oscillation modes in practical engines; and Non-linear dynamics approach used for identifying the onset of f ame loss or combustion instability.

Cloud Computing and Web Services

8-10 August 2012, Coimbatore, India

Principal Investigators:
A. Kannammal
Coimbatore Institute of Technology, Coimbatore
Email: kannaphd@yahoo.co.in

Subhash Kak
Oklahoma State University, Stillwater
Email: subhashk@cs.okstate.edu

With the rapid advances in Computing technology, the past decade has witnessed a proliferation of powerful parallel and distributed systems, networking, internet and the web. Cloud Computing facilitates convenient on-demand network access to a shared pool of configurable computing resources like hardware, software, network, servers, storage, applications and services that can be rapidly provisioned and released with minimal management effort. The main objective of the Indo-US Workshop on Cloud computing and web services was to bring together researchers and industry experts working in cloud computing and related technologies with a focus on recent technological developments, opportunities in a variety of domains like services computing, business models, e-government, agriculture, and challenges like security, privacy, management, and legal issues. The conference provided a forum for the Indian and United States delegates from academic institutions/R&D organizations and practicing professionals to discuss concepts, state of the art, research, implementations and applications and to shape and define the future of cloud computing in multiple directions.

The invited talks by renowned professors from US and Indian Universities like Oklahoma State University, University of California, Arizona State University, IIT, IIIT, IISC, CDAC along with practicing professionals from VMware, IBM and Microsoft, panel discussion and demos loaded with information about the ideas, issues and directions helped the participants to gain in depth knowledge about Cloud Computing and Web Services.

As an outcome of the event, a team led by Dr. S.R.K. Prasad, Correspondent, Dr. V. Selladurai, Principal, Dr. R. Rajesh, Associate Professor/Mechanical Engineering visited University of California Santa Barbara, University of Massachusetts and Stanford University to explore possible collaborative activities between CIT and US Universities. University of California, Santa Barbara and CIT have identified certain areas where both the institutions can work together and these include robotics, wireless sensor networks, prosthetics, nano-materials and neural chemistry. IBM Watson Lab Smarter Planet Team funded collaborative project on "Power Saving in Cloud" would be carried out at CIT. Seven M.Sc. Software Engineering students from CIT have been selected for project internships at Arizona State University (June 2013 to October 2013).

Systems Architectures for Big Data

16 August 2012, Kochi, India

Principal Investigators:

Venkat Rangan
Amrita University, Kochi
Email: venkat@amrita.edu

Krishnashree Achuthan
Amrita University, Kochi
Email: krishna@amrita.edu

Sreeranga Rajan
Fujitsu Lab, Sunnyvale
Email: sree@us.fujitsu.com

Kaladhar Voruganti
NetApp Advanced Technology Group, Sunnyvale
Email: Kaladhar.Voruganti@netapp.com

Michael Franklin
University of California Berkeley
Email: franklin@cs.berkeley.edu

Ethan Miller
University of California Santa Cruz
Email: elm@cs.ucsc.edu

Patrick McDaniel
Pennsylvania State University
Email: mcdaniel@cse.psu.edu

Margo Seltzer
Harvard University, Boston
Email: margo@eecs.harvard.edu

The confluence of innovation in mobile technologies, high speed networks, affordable data analytics architectures/algorithms, social network infra-structures, and scalable cost effective data center server, network and storage architectures are enabling the generation, sharing, analysis and archival of data like never before in human history. Increasingly, the data being generated in this information highway is in the form of streaming media (text, audio and video) where the data is continuously generated analyzed and stored. The Indo-US workshop on **Systems architectures for big data** focussed on the streaming aspects of data impacts the following different areas: system architectures, algorithms, security/privacy, and human usability factors.

The workshop was well attended by over 60 participants from various technical institutions, industry and Govt. Departments. The workshop was broken into three parts: 1) Talks by the invited guests, 2) Breakout session discussions, and 3) Presentations on the project ideas that were identified during the breakout sessions. The main conclusion of the participants was that there are many key research problems that need to be solved in the area of streaming big data. In order to ensure focus during the breakout sessions, the summit was broken into the following three research tracks: 1) Streaming Big Data Analytics 2) Building Data Analytics Platforms for Societal Impact and 3) Security and Privacy Protocols.

Women Engineers Leading Global Innovation

29-31 August 2012, Bangalore, India

Principal Investigators:
Anuradda Ganesh
IIT Bombay, Powai
Email: aganesh@iitb.ac.in

Karen Horting
Society of Women Engineers, Chicago
Email: karen.horting@swe.org

Engineering and technology leaders should take advantage of increased globalization to improve collaboration and innovation. As the global marketplace becomes more accessible, academia and industry both can leverage the shrinking landscape to exchange ideas and implement cutting edge programs. Globally, the number of engineers and technologists is dropping which increases the need of fully utilizing all resources. Acting upon these dynamics, an Indo-US workshop titled **Women engineers' leading global innovation** was organized to target women in academia and industry in India and the US, to advance communication, collaboration, and education.

This symposium used synergies to advance the personal and professional development of the attendees. The objectives addressed the following needs: to introduce and create active linkages between industry and academia leaders in engineering and technology across borders; to develop a network, and cohort, of US and Indian leaders in engineering and technology; to provide insights regarding the cutting edge innovations effecting engineering and technology; and, to recognize the unique challenges of gender diversity in the engineering and technology workforce and propose potential solutions to increase gender diversity.

Pancreatic Islets: From Isolation to Transplantation

14-15 September 2012, Hyderabad, India

Principal Investigators:
D. Nageshwar Reddy
Asian Institute of Gastroenterology and Asian Healthcare Foundation, Hyderabad
Email: aigres.mit@gmail.com

Balamurugan Appakalai
University of Minnesota,
Schulze Diabetes Institute, Minneapolis
Email: bala@umn.edu

Islet cell dysfunctions, as encountered in diabetes, pancreatitis, and pancreatic cancer including neuroendocrine tumors of pancreas, pose enormous health challenges and cause considerable morbidity and mortality globally. Progressive islet dysfunctions lead to loss of glycaemic control and its associated pathology. Patients with type-1 diabetes or chronic pancreatitis often resort to islet transplantation when it is considered that favourable glycaemic control cannot be optimally achieved by conventional therapeutic approaches. Transplantation of isolated islets of Langerhans (the insulin secreting cells from the pancreas) offers a physiological approach towards optimal glycaemic control. Islet transplantation offers the advantage of being less invasive than whole organ pancreas transplantation and is currently offered at a few advanced centers in American and European countries, although at a high cost to the patient. Current experience shows that multiple transplants are required and long-term islet function remains poor. In order to optimize methods related to isolation, culture, preservation and transplantation of islets and initiate measures within India to establish islet transplantation centers, an Indo-US workshop titled **Pancreatic islets: from isolation to transplantation** was organized. The workshop brought together clinicians and scientists working in this field not only to translate such efforts for patient benefits, but also to usher in active collaborations between research groups.

About 225 clinicians and scientists participated in the two day conference. The new developments

presented at the event included methods to ensure quality control in isolating islets; existence of islet dysfunction before the onset of secondary diabetes; use of immune-isolatory devices for islet transplantation; and, potential use of stem cells and xeno transplantation. The major recommendations of the event included the following: constituting a core group involving Indian and US researchers to evolve a road map for islet transplant programme in India; establishing infrastructure facilities (cGMP) for islet transplant programme in India; training personnel at US islets centres; and promoting collaborative research through submission of projects to federal agencies in India and US.

21st Century Developments in Bone Regeneration Technology

10-11 October 2012, Shimla, India

Principal Investigators:
Ashish Jain
Panjab University,
Chandigarh
Email: ashish@justice.com

John L. Ricci
NYU College of Dentistry,
New York
Email: john.ricci@nyu.edu

Sachin Mamidwar
Orthogen, LLC, Springfield
Email:
smamidwar@orthogencorp.com

The most common causes for tooth loss are poor oral hygiene and periodontal disease. Tooth loss leads to problems associated with eating and chewing and adversely affects the overall health of the patient. As a result of tooth loss, people also lose bone from the mandible or maxilla. Dental implants or bridges are used to treat tooth loss. The use of dental bone grafts has increased sharply in India over the last 5-7 years with an increased emphasis on their use in dental teaching programs. Bone grafts enable people to retain their own teeth or to replace lost teeth with implants or bridges, resulting in a healthier lifestyle. In order to bring together Indian clinicians and researchers to gain knowledge of advanced products and techniques

now available and also to allow US clinicians, researchers, and industry experts to understand the clinical situation in India,) an Indo-US workshop was organized on **"21st century developments in bone regeneration technology"**.

Back to Contents

Disorders of the Developing Brain

27-28 October 2012, Manipal, India

Principal Investigators:
Girisha K.M.
Kasturba Medical College, Manipal
Email: girishkatta@gmail.com

John M. Graham Jr
Cedars Sinai Medical Center, Los Angeles
Email: john.graham@cshs.org



With the advances in the clinical and molecular front, we are on the verge of entering a new era of understanding morphology and functions of brain, genetic defects underlying various monogenic and multifactorial disorders of brain development and therapeutic interventions based on new discoveries. Techniques like exome sequencing, linkage analysis and genome-wide association studies call for international collaboration between clinicians and scientists across the globe to disseminate knowledge, explore team work, identify new genes and bring in ideas to treat disorders of brain. Towards this end, an Indo-US workshop on **"Disorders of the Developing Brain"** was organized to bring together eminent clinicians and scientists from India and USA to deliberate various aspects of brain development and disorders: developmental genetics, malformations, intellectual disability, autism, epilepsy, behavioral disorders, clinical evaluation, imaging of brain, diagnostic testing, pathophysiology, treatment, supportive care, genetic counselling, prevention and prenatal diagnosis.

The meeting began with a review of the current status of neurogenetics in India. The meeting highlighted the importance of single cases of rare disorders and included two sessions of case discussions to stimulate research interests among the clinicians and basic scientists. An entire session was dedicated to discussing Indo-US research collaboration. This session highlighted the mutual benefits of collaboration for brain research and technology exchange. The experts agreed that the scientific climate favours collaboration between the two countries for high impact scientific research considering the technological capabilities of the US and strength of the Indian scientists in terms of their wealth of clinical material. It was strongly felt that scientists from both the countries should come together for identification of new genes causing human brain diseases that will have significant impact in terms of understanding pathogenesis and exploring treatments based on knowledge of the genetic basis of such diseases.

Delegates and faculty from both the countries expressed their willingness to work together in the area of brain research and explore joint funding opportunities. Young clinical scientists could meet the faculty from both the countries and were encouraged to take up research into brain development and related disorders.

Nutrition Practice Guidelines for Type-2 Diabetes Mellitus: Sharing Evidence and Best Practices to Improve Patient Outcomes

17-18 November 2012, Chennai, India

Principal Investigators:
Nirmala Jesudason
Frontier Lifeline Hospital, Chennai
Email: nimmi.jesudason@gmail.com

K.M. Venkat Narayan
Emory University, Atlanta
Email: knaraya@emory.edu

The incidence and prevalence of Type 2 diabetes is rapidly increasing around the world, causing significant health care and economic challenges. Evidence from randomized controlled trials and other studies show that lifestyle management is the first step in diabetes prevention and management and diabetes prevention is more cost effective than diabetes treatment. Data from the US Diabetes Prevention Program suggest that people from all ages and ethnic groups can modify their diet and exercise in order to lose a small amount of weight to delay or prevent the development of type-2 diabetes. These findings are significant in both the US and India given the fact that, apart from genetic predisposition for diabetes, many people in the US and in India consume diets with low nutritional quality, live sedentary lifestyles, and are overweight. Keeping in mind the fact that a shared exploration of diabetes research gaps, practice guidelines and scientific developments between the US and India would help both countries advance knowledge and practice in diabetes care from an interdisciplinary perspective, an Indo-US workshop titled "**Nutrition Practice Guidelines for Type-2 Diabetes Mellitus: sharing evidence and best practices to improve patient outcomes"** was organized. This conference allowed dieticians and other health care practitioners to explore and evaluate the need for development of nutrition practice guidelines that are cost effective and culturally acceptable in the Indian setting.

A recurring message from the panelists and audience members acknowledged the significant health risks diabetes presents and the need for a multi-level systems approach to risk reduction, such as use of the socio-ecological model. Prevention efforts must take place at the individual, family, community and governmental levels. Furthermore, success is more likely when interventions are aimed not only at individuals but entire populations via programs and policies in the health care and public health arenas. The workshop laid emphasis on the need for more Indo-US collaborative research; greater understanding of individuals' motivation to change health behaviors; and closing gaps in knowledge and implementation of nutrition care among clinicians in India's health care system.

Frontiers in Cancer Biology and Therapeutics

17 November 2012, New Delhi, India and 19 November 2012, Bangalore, India

Principal Investigators:
Lalit Kumar
All India Institute of Medical Sciences (AIIMS), New Delhi
Email: lalitms@yahoo.com

Shiladitya Sengupta
Harvard Medical School, Boston
E-mail: shiladit@mit.edu

The World Health Organization projects over 12 million deaths worldwide in 2030 due to cancer up from 7.6 million in 2008, and over 70% of all mortality will be from emerging economies. In order to develop stronger partnerships between the two countries to leverage the strengths and opportunities to advance understanding of and cures for cancer, an Indo-US workshop on **Frontiers in Cancer Biology and Therapeutics** was organized. The symposium brought together Nobel laureates, a Pulitzer Prize winner, inventors of cancer therapies with knowledge opinion leaders, leading oncologists, young trainees and faculty and lay public to transform the current state of cancer research and perception in India. It also aimed to create a platform for enabling a public private partnership around setting up a Center of Excellence for molecular understanding of Indian cancers in partnership with US partners.

The symposium included a series of talks and panel discussions by experts in the field. Topics covered included genomics and personalized medicine, childhood cancers, transformations in oncology, policy & advocacy and drug discovery in India. The highlight of the event included inspirational talks by Nobel Laureate Dr. Roger Tsien, Pulitzer Prize winning author of The Emperor of All Maladies: A Biography of Cancer, Dr Siddhartha Mukherjee and Professor of Medicine at Harvard Medical School and Co-Founder of Invictus Oncology, Dr. Shiladitya Sengupta. The symposium was also unique in showcasing cancer survivors Lisa Ray, Dr. Harmala Gupta, Dr. Rama Sivaram, Poonam Bagai and their advocacy efforts.

Industry-Academia Interaction in Advanced Biotechnology and Drug Discovery

4-5 December 2012, Varanasi, India

Principal Investigators:

Anoop Misra
Fortis Group of Hospitals, New Delhi
Email: anoopmisra@gmail.com

Yamini Bhusan Tripathi
Banaras Hindu University, Varanasi
Email: yaminiok@yahoo.com

Rai Ajit Srivastava
Integrated Pharma Solutions, LLC,
Email: ajitsriva@gmail.com

Both India and United States are experiencing a huge increase in the diabetic population and associated morbidity and mortality resulting from cardiovascular disease (CVD). In fact, two thirds of all deaths in diabetic patients occur from CVD. In India, as the overall burden of CVD continues to grow, it is expected to be the leading cause of death and disability. About 1 in 3 American adults are pre-diabetic, a 39% jump over 2008 estimates. Thus, there is a clear need for these two countries to join hands in order to take advantage of vast working force in India and an unparalleled wealth of knowledge and experience in the drug discovery and development arena in the US. A timely step in this direction was the Indo-US workshop on **Industry-academia interaction in advanced biotechnology and drug discovery.**

Bringing industry and academia from the US and India together can go a long way to leverage the vast knowledge-base that US and India possess at academic institutions, and at the same time the experience of industry leaders in discovering innovative new drugs in the US would help to adequately harness the expertise of both countries and translate into ways to pave a path to discover innovative new drugs for the treatment of silent killers like diabetes. The symposium was aimed at making efforts for a fruitful and long-lasting interaction among drug discovery scientists from the US and India. The topics discussed at the workshop included: cardiovascular dyslipidemia; inf ammation and metabolic syndrome; non-pharmacological management of metabolic syndrome; diabetes and its complications; system biology in new drug development for metabolic syndrome; and, CAM and alternative medicines for management of metabolic syndrome.

Back to Contents

Study on Best Practices in Enabling Women in Science

10 December 2012, New Delhi, India

Principal Investigators:
Vinita Sharma
Department of Science & Technology (DST),
Govt. of India, New Delhi
Email: vinita.sharma@gmail.com

Dec Ly
US Embassy, New Delhi
Email: LyDX@state.gov

The US and India have a strong history of scientific collaboration, and both countries have produced many preeminent women scientists and science policy makers. Yet in spite of these achievements, women in both countries still face significant socio-cultural and institutional challenges to achieving their full potential in science-related careers. The Indo-US workshop on **Study on Best Practices in Enabling Women in Science** aimed to address three priorities identified under the US-India Strategic Dialogue: Science and Technology; Education; and, Women's Empowerment. This bilateral event was an opportunity to creatively define solutions by leveraging the experience and expertise of experts from both countries.

In her inaugural remarks, Ambassador Powell noted that both countries recognize the importance of empowering women in science and technology and launched a webpage (http://www.indousstf.org/Women-in-Science-Cooperation.html) highlighting US and Indian best practices in this area. The workshop featured congratulatory video messages from Indian-American astronaut Sunita Williams recorded at the International Space Station, and from Assistant Secretary Dr. Kerri-Ann Jones. In the final session, participants established a steering committee on women in science initiatives, as had been recommended at the June, 2012 US-India Joint Commission Meeting (JCM) on Science & Technology.

Cyanobacteria: Molecular Networks to Biofuels

16-20 December 2012, Mumbai, India

Principal Investigators:
Pramod P. Wangikar
Indian Institute of Technology
Bombay, Mumbai
Email: wangikar@iitb.ac.in

Louis Sherman
Purdue University
West Lafayette
Email: lsherman@purdue.edu

The conversion of the early reducing environment to the present oxidizing atmosphere is attributed to the ability of the cyanobacteria to perform oxygenic photosynthesis. These photoautotrophic organisms are the only group of prokaryotes that split water molecules and release oxygen in the atmosphere. Cyanobacteria can be utilized in multiple applications, including as a means to collect and store solar energy, as a renewable feedstock for the production of chemicals, fuels and other valuable products and also as a means to capture carbon dioxide. In many ways, cyanobacteria can perform as low-cost and renewable power plants. However, substantial research is required at various stages for successful realization of this enormous potential. The major objective of the Indo-US workshop organized by **Pramod P. Wangikar** (Indian Institute of Technology Bombay, Mumbai) and **Louis Sherman** (Purdue University, West Lafayette) on **Cyanobacteria: Molecular Networks to Biofuels** was to highlight the current state of fundamental and applied research on cyanobacteria and to identify key challenges for future research.

Internet-Driven Computer Vision

16-19 December 2012, Mumbai, India

Principal Investigators:
Sharat Chandran
Indian Institute of Technology-Bombay, Mumbai
Email: sharat@iitb.ac.in

Martial Hebert
Carnegie Mellon University, Pittsburgh
Email: hebert@cs.cmu.edu

Computer vision technology has slowly moved out of the labs into applications that are being used on a day-to-day basis such as face detection in consumer cameras in the ubiquitous cell phone. The Indo-US workshop on **Internet-driven computer vision** brought together distinguished researchers in imaging, graphics, machine learning, and computer vision to brainstorm on next generation advances in computer vision, specially leveraging on Internet-based data.

The themes around which the workshop revolved were: **"Recognition"** (ability to recognize attributes, poses, and if applicable, activities of whatever is in the scene: people, animals, objects); **"Data-driven vision"** (to address relevance, ranking, and work in consonance with non-visual data, and potentially produce usable data sets); **"Mining videos"** (to segment, summarize, compress, edit and re-target videos); and, **"Digital heritage"** (to reconstruct, restore, and disseminate India's cultural knowledge so that it becomes available to every remote corner).

There were a number of significant contributions covering the breadth of new advances in computer vision presented at the workshop. The work on **"Tweening Boundary Curves of Non-simple Immersions of a Disk"** stands out as a theoretical contribution. A mobile app using computer vision: **"Heritage App: Annotating Images on Mobile Phones",** described a novel method for automatically overlaying information, useful for a tourist taking photos with a mobile phone. It was demonstrated for several Indian monuments and sites. New developments were presented at the event included a method of optical character recognition for poor quality text **"Content Level Access to Digital Library of India Pages"** developed for recognition of Indian scripts; and a method for speeding up image processing **"Accelerating non-local denoising with a patch based dictionary"** was also presented.

Structure, Dynamics and Mechanics of Biological Membranes

27-30 December 2012, Bangalore, India

Principal Investigators:
Ganapathy Ayappa
Indian Institute of Science Bangalore
Email: ayappa@chemeng.iisc.ernet.in

Subra Muralidharan
Washington State University Pullman
Email: subra.murali@wsu.edu

The cell membrane that encapsulates intricate cellular machinery play varied and a complex role in biological systems, as it is both a protective barrier and a selective transporter. Despite extensive experimental and theoretical investigations on cell membranes and their models (collectively referred to as biological membranes), our knowledge and understanding of their intricacies are still evolving. The underlying relationships between the structure, dynamics, and mechanics of biological membranes have recently come into sharper focus through instrumental and theoretical modeling advancements to identify new paradigms for diseases like cancer, breakthroughs for diagnosis, targeted drug delivery and therapy, novel platforms for biosensors and for addressing pressing problems in allied fields such as agriculture, biofuels, and ecological preservation. Many scientists in the US and India are engaged in cutting-edge research in the fundamental and applied aspects of biomembrane research, which is inherently an interdisciplinary field cutting across the physical and life sciences, and engineering. As it is important to identify and foster collaborative research to enable rapid advancements in this field, an Indo-US workshop entitled "**Structure, Dynamics and Mechanics of Biological Membranes"** was organized. This symposium brought together scientists from India and the United States to share and discuss their current research in various aspects of biological membrane structure, mechanics, and dynamics. The symposium sessions focussed on biomembrane structure, dynamics, and mechanics; protein and nanoparticle interactions with membranes; emerging biomembrane theoretical models and molecular simulations; and, advances in instrumental methods for biomembrane structure, dynamics, and mechanics.

The meeting consisted of 19 talks over three days, a poster session with about 20 posters, and a final open discussion and deliberation session. The presentations and discussions covered a range of topics which included the effect of cholesterol on serotonin receptors, membrane fusion, nanomechanical characterization of cells for cancer diagnostics, fusion peptides for HIV, membrane asymmetry, membrane tethers, protein and polymer membrane interactions, phase behavior and salt tolerance in plant cells. Several talks focused on using simulations on model membrane systems using techniques ranging from fully atomistic to continuum models for biological membranes. This mix of theory and experiments was a unique feature of the meeting. Sixty delegates attended the meeting and the audience consisted of students from different parts of the country, several early career faculty as well as industry participants.

Chromosome Stability

17-19 December 2012, Thiruvananthapuram, India

Principal Investigators:
Nishant K.T
Indian Institute of Science Education and Research, Thiruvananthapuram
Email: nishantkt@iisertvm.ac.in

Kaustuv Sanyal
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Email: sanyal@jncasr.ac.in

Eric Alani
Cornell University, Ithaca
Email: eea3@cornell.edu

Lucas Argueso
Colorado State University
Email: lucas.argueso@colostate.edu

Chromosome stability is maintained through elaborate mechanisms that ensure faithful DNA Replication, Repair, Recombination (3Rs) and finally segregation during mitotic as well as meiotic divisions. Errors in these processes are associated with a wide variety of diseases collectively termed as Chromosome Instability (CIN) phenotype. An Indo-US conference on "**Chromosome Stability"** was organized to bring together established and new investigators working in the area of DNA replication, recombination and repair processes as well as chromosome cohesion, centromere and kinetochore structure-function. The workshop was divided into four sessions - Session-I covered DNA repair mechanisms that included talks on DNA mismatch repair, DNA modifying enzymes, DNA damage response and double strand break repair mechanisms; Session II focussed on the role of centromere and kinetochore in chromosome segregation; Session III explored the role of crossing over, meiotic recombination proteins and kinetochore proteins for accurate chromosome segregation; and, Session IV examined the role of DNA replication, chromosome cohesion, and new tools for studying genome stability.

In addition to fifteen resource persons, about twenty students and post-doctoral fellows working in the area of chromosome stability participated in the meeting. The small focused format encouraged extensive interactions between all participants and also encouraged the speakers to present their latest work. A number of research collaborations were also set up during the course of the meeting. The conference was successful, both for creating interactions between genome stability experts from United States and India, as well as for developing genome stability groups in India.

Fostering Synergistic Collaborations to Accelerate Big Data Applications

21-22 December 2012, Pune, India

Principal Investigators:
R. Govindarajan
Indian Institute of Science, Bangalore
Email: govind@serc.iisc.in

Viktor Prasanna
University of Southern California, Los Angeles
Email: prasanna@usc.edu

There is a heightened recognition and focus on the role of Big Data in achieving scientific and engineering breakthroughs to benefit humanity. The software platforms for Big Data applications need to be supported not just by HPC systems but also by emerging accelerated infrastructure such as Cloud computing. An Indo-US workshop on "**Fostering synergistic collaborations to accelerate big data applications"** was organized to explore synergistic collaborations between researchers from US and India in the convergence of Big Data Software Platforms and Accelerated Systems Infrastructure to support scientific advancement. The aim of the workshop was to launch mutually beneficial collaborations between computer scientists and researchers from across scientific disciplines in this intersection of accelerated systems and massive data platforms to meet the needs of scientific applications. The workshop brought together participants from US and India to identify promising topics that hold common interest, areas of complementary skills, and the models for sustainable collaboration through a virtual institute.

The workshop identified a valuable opportunity to catalyze joint Indo-US research on software cyber-infrastructure with the potential for significant impact genomics and weather modeling, which would lead to better scientific discoveries and improved education and training of students and junior researchers. The workshop has identified key collaborations that would have maximal impact and recommended that leading researchers put together a proposal for an Indo-US Center on Software Cyber-infrastructure to Accelerate Big Data Applications.

Implementation of Sustainable Technologies for Water/ Wastewater Treatment and Water Reuse

7-11 January 2013, Chennai, India

Principal Investigators:
T. Pradeep
Indian Institute of Technology-Madras, Chennai
Email: pradeep@iitm.ac.in

Sukalyan Sengupta
University of Massachusetts, Dartmouth
Email: ssengupta@umassd.edu

Water use has increased ten-fold between 1900 and 2000. Eighty-eight developing countries, containing close to one-half of the world's population, already experience water deficits, with resulting constraints on human ecosystem, health, as well as economic development. According to the World health Organization, 1.1 billion people around the world lacked access to improved water supply and more than 2.4 billion (40% of world's population) lacked access to improved sanitation in 2000. It is reported that the greatest development failure of the twentieth century has been the failure to provide safe drinking water and adequate sanitation services to all people.

The main objectives of the Indo-US workshop on "**Implementation of sustainable technologies for water/wastewater treatment and water reuse"** included identification of methodologies for assessment of reliable source of water supply; emerging technologies for clean and affordable water; emerging contaminants and new analytical techniques; sustainable water supply for rural and under privileged communities; coastal zone water issues in addressing water supply as well as environmental protection; efficient distribution/ collection systems to minimize transmission losses; centralized vs. decentralized systems for water supply and wastewater management; public private partnership in water supply and wastewater management; etc.

Point-of-Care Healthcare Technologies

16-18 January 2013, Bangalore, India

Principal Investigators:
Manjunatha Mahadevappa
Indian Institute of Technology-Kharagpur
Email: mmaha2@gmail.com

Atam P. Dhawan
New Jersey Institute of Technology, Newark
Email: Dhawan@adm.njit.edu

Though the challenges of providing high-quality healthcare in developing countries are different than those in developed countries, there is a common goal to provide access to health monitoring and assessment technologies to people with limited or no healthcare facilities. While the developed countries may find Point-of-Care (POC) technologies as effective means for reducing healthcare costs and improving efficiency, POC technologies are critical in responding to essential healthcare needs in countries with large populations in rural areas. The developing countries in the eastern part of the globe accounting for more than 2/3rd of the world population face the basic challenge of providing minimal healthcare to all people living in adverse geographical or economic constraints, and also monitoring critical diseases and infections such as HIV/AIDS, TB, malaria, etc. The challenge becomes even more critical in the situation of potential outbreak of an epidemic.

The Indo-U.S conference on **Point-of-care healthcare technologies** focused on innovation, research, technology development and best practices in deployment of health monitoring technologies in developing and developed economies for better global healthcare. The conference featured research presentations and technology panel discussions and forums on recent technological advances and global issues on implementation of POC technologies. The conference provided a unique global networking opportunity with leading researchers, students, medical and industry professionals, and policy makers in innovative healthcare technologies.

Back to Contents

Biodiversity Informatics

19-20 January 2013, Bangalore

Principal investigators:
Gladwin Joseph (Chakravarthy)
Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore
Email: gladwin@atree.org

Cynthia Sims Parr
Encyclopedia of Life, National Museum of Natural History
Smithsonian Institution, Washington D.C.
Email: parrc@si.edu

Biodiversity informatics is an emerging and evolving discipline. The area is motivated by efforts at documenting, detailing and databasing all living organisms of the world. The subject has assumed increased importance with a concern for biodiversity conservation in the wake of clear indications of climate change, habitat loss and consequently loss of biodiversity. Biodiversity Informatics is a coming together of taxonomists, biologists and computer scientists for using the Internet to provide open access to biodiversity information that will catalyze the science of taxonomy and advance conservation.

In order to bring the current biodiversity informatics initiatives in India and exchange information with those involved in advanced biodiversity informatics in the United States, an Indo-US Workshop titled "**Biodiversity Informatics"** was organized. The event focused on bringing taxonomists and technologists together to exchange views on leveraging information technology for biodiversity informatics. The goals of the workshop were to undertake a survey of the state-of-the-art biodiversity initiatives in India and the United States; to propose improved standards for species pages and species distributions for convergence and exchange among diverse biodiversity portals; to promote integration of diverse geospatial data with species pages; and, to facilitate increased citizen motivation and involvement in biodiversity informatics.

Novel Tools and Themes in Vision Sciences

21-22 January 2013, Hyderabad, India

Principal Investigators:
Subhabrata Chakrabarti
IL.V. Prasad Eye Institute, Hyderabad
Email: subho@lvpei.org

Uday B. Kompella
University of Colorado Anschutz Medical Campus, Aurora
Email: uday.kompella@ucdenver.edu

Blindness affects around 20 million people in India and occurs due to various ocular malfunctions caused by cataract, refractive errors, ocular infections, corneal diseases, glaucoma and retinal diseases. There is an increase in the prevalence of age-related and complex eye diseases both in India and the US due to the changing demographics, senescence and life style factors. Studies on health economics have predicted alarmingly slow economic growths due to the loss of valuable productive years of an individual impoverished by visual impairment and blindness. A comprehensive management based on our current understanding of the disease pathophysiology and therapeutics is a major challenge worldwide. There have been some remarkable success stories due to the applications of stem cells and regenerative medicine in ophthalmology, use of nanotechnology and very recently the restoration of vision in some forms of retinal blindness by gene therapy. Thus, it is imperative for both these countries to jointly undertake translational research in ophthalmology and vision care based on their respective resources and expertise. Adequate efforts are required to take advantage of the bench-side discoveries for bedside applications from innovative research in both these countries.

The Indo-US Workshop titled **"Novel Tools and Themes in Vision Sciences"** aimed towards creating long-lasting collaborations between the scientists, clinicians and young graduates and fellows across these nations for better eye-care management and applications to eradicate blindness and visual impairment. The event also helped foster interactions among the academia and industry for devising novel diagnostics and therapeutic options and also to propagate public awareness. Sustained Indo-US collaborative efforts and research innovation and excellence are ideal for identifying causes for complex eye diseases and developing novel diagnostic, preventive, and treatment strategies. This highly interactive symposium addressed four major themes and tools in vision sciences including "omics" of complex eye diseases, biology of the retina, nanoscience applications in ophthalmology, and vision neurosciences.

Innovative Approaches and Technologies for Diabetes Prevention and Management

4-6 February 2013, New Delhi

Principal Investigators:
Bela Shah
Indian Council of Medical Research (ICMR), New Delhi
Email: shahb@icmr.org.in

Judith Fradkin
National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
National Institutes of Health (NIH), Bethesda
Email: fradkinj@mail.nih.gov

Diabetes is a burgeoning global health problem that is straining the public health systems of developed and developing nations. In India and the United States alone, tens of millions of people are suffering every day from the scourge of this chronic disease and its serious health complications, which include kidney failure, heart disease, adult-onset blindness, and lower limb amputations. A significant number of affected individuals worldwide do not know they have the disease. In both nations, diabetes is increasingly striking in younger age groups, with potentially devastating implications for the health, well-being, and productivity of future generations. Affordable and practical approaches and technologies for preventing and managing the disease and its complications are urgently needed in both countries to reduce both the human toll and high cost of care.

An Indo-US workshop on **"Innovative Approaches and Technologies for Diabetes Prevention and Management"** was organized to bring together researchers and funding officials from both countries to identify specific research needs and opportunities in high priority diabetes research areas of joint interest. The outcome of this workshop will be used to develop a joint Funding Opportunity Announcement (FOA) with funding from both the Indian Council of Medical Research and the National Institute of Diabetes and Digestive and Kidney Diseases.

The opportunities for collaborative research identified by participants included inviting Indo-US research teams to investigate the impact of maternal diabetes and/or nutrition on diabetes risk in progeny; the role of factors such as diet composition, stress, and depression in development of diabetes; genetic differences affecting risk; population differences in metabolism, fat deposition, and diabetes complications; similarities and differences between native and US-based Indian populations in terms of diabetes risk, onset, development, complications, intervention, and prevention; characteristics and epidemiology of youth onset diabetes in the United States and India; challenges and strategies for effectively implementing behavioral changes that could prevent diabetes and/or improve outcomes; and, use of mobile technologies to assist both patients and health care workers in diabetes management, especially in low resource settings.

Electrocatalytic Materials for Fuel and Biofuel Cells

26-28 February 2013, Varanasi, India

Principal Investigators:
V. Ganesan
Banaras Hindu University, Varanasi
Email: velganesh@yahoo.com

Shelley D. Minteer
University of Utah, Salt Lake
Email: minteer@chem.utah.edu

Electrocatalysis and bioelectrocatalysis are important process in fuel and biofuel cells respectively that are alternatives to conventional batteries. In order to discuss the latest developments in electrocatalysis and bioelectrocatalysis leading to fuel and biofuel cells, an Indo-US workshop on "**Electrocatalytic Materials for Fuel and Biofuel Cells"** was organized. This conference helped benefit Chemists in general, young researchers, teachers, industrialists and students in particular and who would like to begin research in this field.

The conference focused on the work of a galaxy of leading experts and researchers from the US and India through their deliberations and presentations in frontier areas of fuel and biofuel cell research, to review current status, highlight future challenges and possible commercialization of fuel and biofuel cells through industries. The workshop bridged the traditional core areas of electrochemical science and technology and interfaced these with materials, technological, biological, and other bio-energy devices.

Back to Contents

Molecular Imaging (68Ga PET) and Targeted Radionuclide Therapy: Preclinical Evaluation and Clinical Applications

27 February - 1 March 2013, Chandigarh, India

Principal Investigators:
Baljinder Singh
Post Graduate Institute of Medical Education and Research, Chandigarh
Email: drbsingh5144@yahoo.com

Michael K. Schultz
Carver College of Medicine, University of Iowa, Iowa City
Email: michael-schultz@uiowa.edu

The use of Ga-68 for molecular imaging of cancer and other diseases has witnessed a dramatic increase over the last decade as production technologies have improved and become attractive to individual site purchase and operation for diagnostic imaging agent production. The Indo-US symposium on "**Molecular Imaging (68Ga PET) and Targeted Radionuclide Therapy: Preclinical Evaluation and Clinical Applications"** aimed to offer a unique forum for high-level scientific discussions on the recent developments in the exciting field of Theranostics, where Ga-68 is playing an increasingly larger role in drug development. The recognition of the potential for Ga-68 imaging of targeted drug therapies has led to a common belief that these new compounds are leading the way to personalized medicine using molecular Imaging (SPECT/PET/CT) and targeted radionuclide therapy (beta and alpha emitters).

The symposium organized by the Department of Nuclear Medicine & PET at the Postgraduate Institute of Medical Education and Research (PGIMER), was targeted at chemists, physicians, and investigators dealing with generators, PET radiochemistry as well as molecular imaging and radionuclide therapy.

There were 70 invited talks, 27 oral presentations and 80 poster presentations.

The scientific deliberations at the event indicated the challenge as being to combine advances in radionuclide technologies with new discoveries of molecular target expression in cancer cells for more precise delivery of therapies. The discoveries presented in the meeting are the foundation for the next generation of molecular targets for selective delivery of radiation dose to tumor cells for diagnosis, monitoring and selecting patients that can benefit most from receptor-targeted radionuclide therapies.

Nano-Structured Electronic Materials: Challenges & Relevance to Electronics & Energy Research

8-10 March 2013, Thrissur, India

Principal Investigators:
Dinesh P. Amalnerkar
Centre for Materials for Electronics Technology, Pune
E-mail: amalnerkar@cmet.gov.in

V. Renugopalakrishnan
Northeastern University, Boston
E-mail: v.renugopalakrishnan@gmail.com

With global energy use set to rise by 51% by 2035, renewable sources of energy and electronics are the only feasible way to create a secure energy future and future generation consumer electronics. Silicon is the cornerstone of most of the known technologies in the field of electronics and energy. The silicon semiconductor industry has charted an itinerary for itself for the next 5 years, which basically continues on the density and performance improvements of the past 50 years. Practical and/or fundamental limits are being approached and substantial changes to device technologies and structures are going to be required. A host of new materials are at the dawn of development and show promise for their exploitation in these critical fields of energy and electronics. The tailoring of the materials in the nano-scale regime for exploiting their exciting properties yet opens up major fundamental/ application oriented opportunities and challenges that need to be devoured, addressed and cracked.

Hence the aim of the Indo-US workshop titled "**Nano-structured Electronic Materials: Challenges & Relevance to Electronics & Energy Research"** was to focus on Nano-scale Materials Challenges, with a special emphasize on electronics and energy technologies beyond silicon. The event provided a much needed platform for a wide spectrum of researchers, academics, scientists, engineers and industries to interact, exchange and disseminate knowledge; and, arrive at a roadmap to counter the future technological challenges associated with modern electronics and energy sector.

Back to Contents

TRAINING PROGRAMS

Advanced Modeling and Data Assimilation for Tropical Cyclone Predictions with Special Reference to the Hurricane Weather Research and Forecasting (HWRF) System

9-14 July 2012, Bhubaneshwar, India

Principal Investigator:
U.C. Mohanty
Indian Institute of Technology-Delhi
Email: mohanty@cas.iitd.ernet.in;
ucmohanty@gmail.com

S.K. Roy Bhowmik
India Meteorological Department, New Delhi
Email: skrb@imdmail.gov.in

Sundararaman G. Gopalakrishnan
National Oceanic and Atmospheric Administration, Miami
Email: gopal@noaa.gov

Frank Marks
National Oceanic and Atmospheric Administration, Miami
Email: Frank.Marks@noaa.gov

In their November 2010 Joint Statement, Prime Minister Singh and President Obama renewed their commitment to the relationship between India and the United States as a defining partnership of the 21st Century. They identified weather and climate forecasting for agricultural production as a priority area for collaboration between the two countries. The National Oceanic and Atmospheric Administration (NOAA) has since signed a bilateral agreement with India's Ministry of Earth Sciences (MOES) to improve tropical cyclone forecasting over the Indian seas. In order to share NOAA's advanced understanding and forecasting techniques acquired in the last few years, an Indo-US workshop on "**Advanced Modeling and Data Assimilation for Tropical Cyclone Predictions with Special Reference to the Hurricane Weather Research and Forecasting (HWRF)"** system was organized. The first half of the workshop covered various aspects of tropical cyclone research,

developments and future advancements. This was followed by advanced training on research aspects of the Hurricane Weather Research and Forecasting (HWRF), high-resolution regional modeling system currently used in USA for track, intensity and structure predictions with a focus on the following topics: Tropical Cyclone Inner Core Initialization and data assimilation issues over Indian seas; joint

development of a next generation research and operational system, including a HWRF coupled storm surge prediction system for tropical cyclone prediction over the Indian seas and the subsequent flooding of land falling storms; and, impact analysis, risk and vulnerability assessment aspects of tropical cyclones.

The workshop accomplished the prime goal of capacity building and infrastructure sharing under the NOAA-MoES agreement for weather ready nations (US and India). In addition, the exchange of state-of-the-art knowledge and prediction techniques immensely benefited not only the participants but also the resource persons from both the countries. Proceedings from this workshop have been published as a special monograph on Modeling and Data Assimilation for Tropical Cyclone Predictions, which will serve as a useful reference for students and researchers.

The outcome of this event has set the stage for extensive advancement in tropical cyclone prediction over Indian seas so as to reduce the current track prediction errors by at least 20% by 2015. Further, present intensity and rainfall forecast skill of 3-days may be achieved in 5-days forecast by 2015. It should be noted that the state-of-the-art NOAA's HWRF modeling system (atmospheric component) is in use at IMD in a collaborative mode with the active participation of IIT Delhi scientists. It would be the basis for perusing the joint efforts among IMD, IIT Delhi and INCOIS and USA counterparts to have a coupled HWRF system for Indian seas in the future.

CENTERS FOR RESEARCH EXCELLENCE IN SCIENCE & ENGINEERING

Indo-US Centre for Research Excellence in Science and Engineering (CRESE) on Fabrionics

Lead Partners:
Amitabha Ghosh
Bengal Engineering and Science University, Shibpur
E-mail: amitabha@iitk.ac.in

Shiv G. Kapoor
University of Illinois at Urbana-Champaign
E-mail: sgkapoor@uiuc.edu

Ashutosh Sharma
IIT- Kanpur
E-mail: ashutos@iitk.ac.in

Marc Madou
University of California, Irvine
E-mail: mmadou@uci.edu

Other Partners:
Northwestern University, Illinois
University of Illinois, Chicago
University of Missouri, Columbia
IIT- Kharagpur
Central Mechanical Engineering Research Institute, Durgapur

With the emerging capabilities and rapid progress in the fields of molecular engineering, micro and nano-system technology, material science and computer engineering, the ability to manufacture micro- and nano- sized devices and autonomous machines will bring unprecedented changes in human society. The challenges are primarily a result of the current trend for miniaturization, development of new exotic nonmetallic materials and the lessons our scientists and engineers are learning from nature. Having identified and recognized this emerging new branch of technology through deliberations at the Indo-US Workshop on "**Futuristic Shaping Technology at Meso, Micro and Nano Scales"** held at IIT Kanpur in 2007, the participants coined the term "Fabrionics" to connote this multi-disciplinary facet of engineering sciences.

Based on the collaborative research and development work achieved under the umbrella of the earlier IUSSTF supported **Indo-US Joint Centre for Advanced and Futuristic Manufacturing**, a consortium was formed through the signing of an MoU by the five collaborating universities - IIT Kanpur; and IIT-Kharagpur from India along with the University of Illinois-Urbana Champaign; University of California-Irvine; and the Northwestern University-Evanston from USA. Considering the outcome and achievements of the Joint Centre on Advanced Manufacturing, IUSSTF awarded the **Indo-US CRESE on Fabrionics** in order to consolidate and continue the collaboration for by intensifying the academic cooperation through enlarging the participating group by inducting new institutions to bring in a multi-disciplinary expertise along with the active involvement of industry and entrepreneurs required to translate the R&D outcome. Each year, two workshops are organized – one in the US and one in India. Besides this, two lecture series for students have also been arranged that will result in books published by Springer. New smart materials for micro actuator, processes for micro forming and machining, different types of biosensors and some advanced nano- structured materials have already been developed.

The primary areas chosen for R&D project based work by the CRESE in Fabrionics include:

- New strategies/approaches for Fabrionics and shape generation through material manipulation at meso, micro and nanoscales;
- Fabrication at small scale using exotic materials-soft materials, bio materials, polymers, gels, composites etc;
- Fabrication and use of carbon Nanoelectromechanical systems (NEMS)/ Microelectromechanical systems (MEMS);
- Generative manufacturing processes-direct metal deposit techniques for micro sized parts;
- Shape generation by self assembly technique and self patterning;
- Micro fluidic-based micro devices;
- AFM based technology for mRNA isolation and protein sequencing;

- Smart material actuated micromechanism and micro devices;
- Protein motors for actuating autonomous nano robots and manipulators;
- Micro machine tools and micro factories;
- Hybrid multi-scale process development; and
- Developing the curriculum for joint teaching programs on "Fabrionics".

Research projects awarded

Consequent to the institution of the IUSSTF supported joint center has led to the following research projects getting funded to the respective partnering groups:

(i) *Characterization of μ-EDM* (PI: J. Ramkumar, IIT, Kanpur) funded by Department of Science and Technology, Govt. of India
(ii) *Development of multi-purpose micromachine tools for milling and EDM* (PI: Naga Hanumaiah, CMERI) funded by the Council of Scientific and Industrial Research, Govt. of India
(iii) *Magnetic field -assisted material removal in micro electric discharge machining process* (PI: S.G. Kapoor in collaboration with IIT, Kanpur and CMERI) funded by NSF for 3 years (2010-2013; $375,000.00)
(iv) *Laser-induced plasma micro-machining* (PI: K.F. Ehmann in collaboration with CMERI and IIT, Kapur) funded by NSF for 3 years (2010 - 2013; $411,808.00)

Patents filed

(i) Ghubade A., Mandal S., Chaudhury R., Singh R.K., Singh D., Gurunath R. and Bhattacharya S. Title of the invention: *Integrated di-electrophoresis based concentration of pathogenic bacteria and quantization using ImageJ.*
(ii) Singh R.K., Basu B. and Bhattacharya S. Title of the invention: *A novel 2/3-Dimensional Soft-lithography technique to formulate micro-channels and evaluation of various associated mechanical and biological phenomena.*

As an outcome of the Centre activities the following research publications have been generated in the year 2012-13:

(i) Basu T.S, Ghosh S, Thiagarajan S.J, Yang R, Gierlotka S, Ray M (2013) *Remarkable thermal conductivity reduction in metal-semiconductor nanocomposites.* Appl. Phys. Lett.
(ii) Jana A, Ghosh S, Devi PS, Bandyopadhyay N.R, Klie R.F, Ghosh S, raja S.O, Dasgupta A.K (2013) *Gold Nanoparticle Encapsulated Luminescent Silicon Quantum Dots.* ACS Nano.
(iii) Jana A, Ghosh S, Devi PS, Bandyopadhyay N.R, Ray M (2013) *Unusual Charge Transport through Defect free n-ZnO Flower on Au coated Macroporous p-Si.* Appl. Phys. Lett.
(iv) Ray M, Jana A, Ghanta U, Bandyopadhyay N.R, Hossain S.M (2013) *Photoluminescence from Oxidized Macroporous Silicon: Nano-Ripples and Strained Silicon Nanostructures.* IEEE Trans. Device Mater. Rel 13:87-92.
(v) Basu T.S, Ghosh S, Gierlotka S, Ray M (2013) *Collective Charge Transport in Semi conductor-Metal Hybrid Nanocomposite.* Appl. Phys. Lett. 102:053107.
(vi) Rishikant, Singh. H, Nayak M., Bhattacharya S (2012) *Optimization of a novel peristaltic micro-pump design with enhanced discharge capabilities and reduced reverse fluid delivery.* Microsystems Technology.
(vii) Singh. H, Nayak M., Rishikant, Singh R.K., Singh D, Gurunath R, Bhattacharya S. (2012) *Integrated Dielectrophoretic preconcentration, sorting and q-PCR based identification of micro-organisms in a single silicon microchip.* Submitted to Lab on Chip.
(viii) Mandal A, Ray M, Rajapaksa I, Mukherjee S and Datta A (2012) *Xylene capped luminescent Silicon Nanocrystals: Evidence of Supramolecular Bonding* J. Phys. Chem 116, 14644-14649.
(ix) Sharma S, Sharma A, Cho Y K, Masou M, (2012) *Increased graphitization in electrospun single suspended carbon nanowires integrated with carbon-MEMS and carbon-NEMS platforms.* ACS Applied Materials & Interfaces.
(x) Maitra T, Sharma S, Srivastava A, Cho Y-K, Madou M, Sharma A(2012) *Improved graphitization and electrical conductivity of suspended carbon nanofibres derived from carbon nanotube/ polyacrylonitrile composites by directed electrospinning.* Carbon 50:1753-1761.
(xi) Raan A, Kulkarni M, Karim A, Sharma A(2012) *Diblock copolymer lamellae on sinusoidal and fractal surfaces.* J. Chem Phys. 136:094903.
(xii) Kulkarni M.M, Yager K, Sharma A, Karin A (2012) *Combinatorial copolymer ordering on tunable rough substrates.* Macromolecules.

Indo-US Centre for Research Excellence in Science and Engineering (CRESE) on Advanced Materials Research

Lead Partners:
Swapan K. Pati
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
E-mail: pati@jncasr.ac.in

Vinayak P. Dravid
Northwestern University, Evanston, Illinois
E-mail: v-dravid@northwestern.edu

Other Partners:
Indian Institute of Science, Bangalore
Argonne National Laboratory, Illinois

With a continued push for miniaturization and the impending roadblock of fundamental physics constraints on the current silicon technology paradigm, there is an urgent need to diversify and enhance the back-bone technologies for the 21st century. This would require not only innovation in electronics but also in information storage, transfer and display to create science-enabled sustainable growth of a globally viable "eco-system" for developed and developing economies. Innovations in quantum materials/phenomena are critical to replace and/or complement existing architecture.

The Center for **Advanced Materials Research** (CAMR) has been anchored by the respective institutions' leadership in materials research, leveraged by established grass-root collaborations and cross-institutional bridge-building. The areas of collaboration being carried out cover broad emerging materials critical for advancing next generation information technology and include nanomaterials, soft matter, molecular electronics, structure- property relationships and computational modeling. The areas being studied are timely and have considerable potential for both advances in fundamental research as well as technological applications.

The objectives of the CRESE include the establishment of grass-root collaborations and cross institutional bridge – building initiatives as well as out-of-the box cyber enabled global education, training and outreach Programs. The centre also promotes the exchange of graduate students, post doctoral fellows and faculty members between partnering institutions.

The project period witnessed enhanced joint activities between JNCASR (and IISc) and Northwestern University with ANL representation. These activities have positioned the Joint Center for tangible output and scholarly initiatives. The focus of research has been in three areas in nano-materials; transport in 2D nano materials including grapheme, MoS2 , GaS, GaSe and Bi2 Te3 and their applications in transistors, nano plasmonics and nano-lithography. In addition to students and faculty exchanges, this project period included a vibrant and interactive joint workshop between Indian and US counterparts on "Advanced and Nano-Structured Materials" that was held during January 21-22, 2013. The partnering institutes are identifying more ambitious problems that cannot be solved by one counterpart alone. Additionally, incentives and ideas are thought upon to encourage young researchers from NU to visit JNCASR for longer duration by identifying the value added.

Research publications generated in 2012-13

(i) Vivekchand, S.R.C, Engel C.J, Lubin S.M, Blaber M.G, Suh J.Y, Zhou W, Schatz G.C, Odom T.W (2012) *Liquid Plasmonics-Manipulating, Surface Plasmon Polaritons via Phase Transitions.* Nanoletters 12:4324-4328.

(ii) Blaber M.G, Engel C.J, Vivekchand, S.R.C, Lubin S.M, Odom T.W , Schatz G.C,(2012) *Eutectic Liquid alloys for Plasmonics: Theory and Experiment* Nanoletters 12:5275-5280.

(iii) Raidongia K, Huang J (2012) *Nanofluid Ion Transport through Reconstructed Layered Materials* Journal of American Chemical Society 134:16528-16531.

(iv) Dattatray J.L., Liu B., Ramakrishna Matte H.S.S., Rao C. N. R. and Dravid V.P. (2012) *Rapid characterization of ultra-thin layers of chalcogenides on SiO2/Si substrate.* Advanced Functional Materials, 22: 1894-1905.

(v) Dattatray J.L., Liu B., Ramakrishna Matte H.S.S., Dravid V.P. and Rao C.N.R. (2012) *Hysteresis in single-layer MoS2 field effect transistors.* ACS Nano, DOI: 10.1021/nn301572c.

(vi) Dattatray J.L., Liu B., Liu J., Yan A., Matte H.S.S.R., Grayson M., Rao C.N.R. and Dravid V.P. (2012) *GaS and GaSe ultrathin layer transistors.* Advanced Materials, DOI: adma. 201201361.

As part of the visitations under the CRESE, five scientists from India visited their collaborators in the US institution.

Indo-US Centre for Research Excellence in Science and Engineering (CRESE) on Nanobiotechnology

Lead Partners:
K. VijayRaghavan
National Center for Biological Sciences, Bangalore
E-mail: vijay@ncbs.res.in

Shiladitya Sengupta & Jef Karp
Harvard Medical School, Brigham and Women's Hospital, Cambridge, MA
E-mail: shiladit@mit.edu & jeffkarp@mit.edu

Other Partners:
Harvard-MIT Division of HST, Cambridge

InStem, Bangalore

Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore

Two emerging areas that will dramatically impact medical sciences in the future are stem cell biology and nanotechnology. Although, these two areas are already intersecting, the interface between these areas offers an untapped niche for scientific exploration and inventions that will revolutionize translational medicine. This Centre for Research Excellence in Science and Engineering on nanobiotechnology brings together the strengths of groups at the National Centre for Biological Sciences (NCBS), Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) and InStem and the core expertise of Harvard-MIT Division of Health Sciences and Technology in material sciences and nanotechnology.

The Joint Centre has three major goals:

(i) Development of a strong research program elucidating the role of nanostructures in stem cell biology in the vascular context;
(ii) Development of a strong training component and exchange program; and
(iii) Aggressive pursuit of translation of technology developed by promoting an entrepreneurial culture and partnerships with the industry.

Specifically as the research component, the focus is on the mechanistics underlying the recruitment and differentiation of stems cells into vascular structures, and the development of novel nanostructures that can perturb this process. This will enable the understanding of the process of vasculogenesis, which holds the key for regenerative medicine critical for the management of conditions such as ischaemic heart diseases, peripheral artery diseases and diabetic sores. Furthermore, nanostructures that promote the process can be engineered as scaffolds that can be harnessed as therapeutics in the above conditions. In contrast, nanostructures that are engineered to inhibit the process could evolve as potential therapy for pathological conditions characterized by overt neovascularization, including cancer, diabetic retinopathy and rheumatoid arthritis.

The collaboration between the partners brings together scientists from a multidisciplinary background, where chemical engineers, polymer chemists, material scientists, and nanotechnologists work closely with molecular and cell biologists. It is anticipated that this exchange of knowledge would enable the development of expertise on both continents. Furthermore, annual training programs would be conducted at NCBS on tools and technologies in the area of bio-nanotechnology, which would be open to scientists across India.

Three active research projects have already been initiated by the binational team are:

(i) *Heparan Sulfate Glycosaminoglycans (HSGAGs) in human ES cell differentiation into cardiovascular lineages* (Shiladitya Sengupta, Harvard-MIT and Maneesha Inamdar, JNCASR); and

Back to Contents

(ii) *Mechano-biology of the stem cell niche and the control of quiescence* (Jeff Karp, Harvard-MIT and Jyotsna Dhawan, InStem)

(iii) *Harnessing the human mesenchymal stem cell (hmsc) secretome for cardiovascular regeneration using bioengineering strategies* (Sudhir H. Ranganath, JNCASR, Maneesha Inamdar, JNCASR and Jeffrey M. Karp, Harvard-MIT).

As part of the CRESE activities, several exchange visits have been undertaken. Jeff Karp visited NCBS/InStem in November 2010 and in March 2011 and participated in scientific discussions. Shiladitya Sengupta visited NCBS/InStem in March 2011. R.A. Mashelkar visited Shiladitya Sengupta's laboratory in October 2010.

Abhijit Majumdar was recruited in the joint project between the Dhawan and Karp labs in 2010 and has made substantial progress on generating micro-patterned surfaces for growth and induction of quiescence of mesenchymal stem cells. Sudhir Ranganath was recruited in the joint projects between the Karp and Inamdar labs in August 2010 and has made substantial progress in establishing conditions for study of the hMSC secretome.

Also as part of the CRESE activities, the second meeting of the Boston-Bangalore *Bioengineering Initiative* was held from 07-08 November 2010 at Bangalore to spearhead a discussion between engineers, physicists, chemists, materials science experts and biologists.

Research publications generated:

(i) Sinha Roy R., Soni S., Harfouche R., Vasudevan P.R., Holmes O., de Jonge H., Rowe A., Paraskar A., Hentschel D.M., Chirgadze D., Blundell T.L., Gherardi E., Mashelkar R.A. and Sengupta S (August 2010) Coupling growth-factor engineering with nanotechnology for therapeutic angiogenesis. Proceedings of the National Academy of Sciences USA, 107(31):13608-13

(ii) Paraskar A.S., Soni S., Chin K.T., Chaudhuri P., Muto K.W., Berkowitz J., Handlogten M.W., Alves N.J., Bilgicer B., Dinulescu D.M., Mashelkar R.A. and Sengupta S. (July 2010) Harnessing structure-activity relationship to engineer a cisplatin nanoparticle for enhanced antitumor efficacy. Proceedings of the National Academy of Sciences USA, 107(28):12435-40.

Patents granted/filed:

(i) Paraskar A., Soni S., Basu S., Sengupta P. and Sengupta S. Platinum nanoparticles and methods of use thereof. PCT/US10/23217. Currently being licensed to Invictus Oncology, New Delhi by BWH.

(ii) Sinha-Roy R., Soni S., Harfouche R. and Sengupta S. 1K1 nanoparticles for angiogenesis. PCT filed by BWH. This patent has been licensed to Vyome Biosciences, New Delhi.

Indo-US Center for Research Excellence in Science and Engineering (CRESE) on Nanomaterials for Energy

Lead Partners:

G.U. Kulkarni
Jawaharlal Nehru Centre for Advance Scientific Research, Bangalore
E-mail: kulkarni@jncasr.ac.in

Timothy S. Fisher
Purdue University, Indiana
E-mail: tsfisher@purdue.edu

Sunil Murthy
GE India Technology Centre, Bangalore
E-mail: Sunil.Murthy@ge.com

The India-US Center for Research Excellence in Science and Engineering (CRESE) on Nanomaterials for energy is a collaborative effort between the Jawaharlal Nehru Center for Advanced Scientific Research (JNCASR, Bangalore, India) and Purdue's Birck Nanotechnology Center (West Lafayette, IN USA) with General Electric's John F. Welch India Technology Center (Bangalore, India). To begin with, a Joint Networked Center on Nanomaterials was developed through an IUSSTF-sponsored bi-lateral workshop in Bangalore during August 2008 (http://www.nanohub.org/resources/5514) and draws from the synergistic expertise in physics and chemistry of materials at JNCASR with that of nanofabrication and engineering at Purdue. The Center seeks to find new ways of exploiting the unique properties and characteristics of nanomaterials in a broad range of energy-related applications.

The establishment of this center enabled new synergies among the partners, leading to many tangible outcomes, including the following ongoing technical activities:

(i) *Mechanical stability of packing configurations of polyhedral particles*
Faculty participants: Timothy Fisher (Purdue), Mehboob Alam (JNCASR)

(ii) *Quantum Transport in Nanostructures*
Faculty participants: N.S. Vidhyadhiraja (JNCASR), Erica Carlson (Purdue), Timothy Fisher (Purdue)

(iii) *Light Scattering*
Faculty participants: C Narayana (JNCASR), Arvind Raman & Faculty participants: G.U. Kulkarni (JNCASR), Ronald G Reifenberger (Purdue)

(iv) *Thermal transport in Nanostructures*
Faculty participants: U.V. Waghmare (JNCASR), Timothy Fisher (Purdue)

(v) *Diagnostics at point of care with a cell phone camera*
Faculty participants: G.U. Kulkarni (JNCASR), Ronald G Reifenberger (Purdue)

(vi) *Evaluation of TCE electrode by pattern recognition using fourier transform*
Faculty participants: G.U. Kulkarni (JNCASR), Ronald G Reifenberger (Purdue)

(vii) *Patterning of Grapherne petals for microsupercapacitor application*
Faculty participants: G.U. Kulkarni (JNCASR), Ronald G Reifenberger (Purdue) and Timothy Fisher (Purdue)

(viii) *Photo-thermionic emission from GaN nanowal networks*
Faculty participants: S.M. Shivaprasad (JNCASR), Tim Sands & Tim Fisher (Purdue)

The Joint Centre has led to extended interactions with other institutions with and outside of India such as University College London (UCL), Vellore Institute of Technology (VIT), Tribhuvan University - The University of Nepal, USAF, Res Lab, Thermal Sci & Mat Branch USA, Indian Institutes of Science Education and Research, Trivandrum, Georgia Institute of Technology, USA. The center is halfway in developing a formalism and a computer program that calculates thermal transport through a nano-channel bridging two distinct electrodes from the knowledge of eigenspectrum of the whole system treated as a periodic system, in a way equivalent to the non-equilibrium Green function (NEGF) scheme.

Research projects awarded

Consequent to the institution of the IUSSTF supported joint center has led to the following research projects getting funded to the respective partnering groups:

(i) *First-principles modeling and simulations of thermal properties of hexagonal nanomaterials* (PI: U.V. Waghmare ; Co PI: Timothy Fisher and A. Voevodin) funded by Air Force Office of Scientific Research (AFOSR)/ Asian Office of Aerospace Research and Development (AOARD)

(ii) *Nano thermal interface material development* (PI: Timothy Fisher) funded by Defense Advanced Research Projects Agency (DARPA)

Research publications generated in 2011-12(None published in the year 2012-13)

(i) Kurra N., Prakash G., Basavaraja S., Fisher T.S., Kulkarni G.U. and Reifenberger R.G. (2011) *Charge storage in mesoscopic graphitic islands fabricated using AFM bias lithography.* Nanotechnology, 22: 245302

(ii) Hodson S.L., Bhuvana T., Cola B.A., Xu X.F., Kulkarni G.U. and Fisher T.S. (2011) *Palladium thiolate bonding of carbon nanotube thermal interfaces.* Journal of Electronic Packaging 133(2): 020907

(iii) Smith K.C., Fisher T.S. and Alam M. (2011) *Isostaticity of constraints in amorphous jammed systems of soft frictionless platonic solids.* Physical Review E 84(3) Article Number: 030301

(iv) Saha B., Sands T.D. and Waghmare U.V. (2011) First-principles analysis of ZrN/ScN metal/semiconductor superlattices for thermoelectric energy conversion. Journal of Applied Physics 109(8) Article Number: 083717

(v) Saha B., Sands T.D. and Waghmare U.V. (2011) *Electronic structure, vibrational spectrum, and thermal properties of yttrium nitride: A first-principles study.* Journal of Applied Physics 109(7) Article Number: 073720

(vi) Rout C.S., Kumar A., Kumar N., Sundaresan A. and Fisher T.S. (2011) *Room-temperature ferromagnetism in graphitic petal arrays.* Nanoscale 3(3): 900-903

JOINT NETWORKED CENTERS

Indo-US Joint Center for Rational Control of Functional Oxides

Lead Partners:
D.D. Sarma
Indian Institute of Science, Bangalore
Email: sarma@sscu.iisc.ernet.in

Andrew J. Millis
Columbia University, New York
Email: millis@phys.columbia.edu

Other Partners:
Priya Mahadevan
S.N.Bose National Centre for Basic Sciences, Kolkata
Email: priya.mahadevan@gmail.com

Jak Chakhalian
University of Arkansas, Fayetteville
Email: jchakhal@uark.edu

John Freeland
Argonne National Laboratory, Chicago
Email: freeland@anl.gov

The aim of the *Networked Joint Center for Rational control of functional oxides* is to integrate materials synthesis, physical measurement and theoretical analysis to demonstrate new modalities for rational design and control of electronic functionalities in transition metal oxide-based materials. The specific objectives were the innovative synthesis of designer materials, detailed investigation of their physical properties as well as spectroscopic investigations to obtain microscopic information on their electronic and magnetic properties, and theoretical modeling at several levels. The Center addressed the grand challenge of rationally designing and controlling these phenomena by:

- Combining synthesis of materials in bulk and atomic precision layer-by-layer growth to produce new materials to be studied by state-of-the-art transport and spectroscopic measurements and with forefront theoretical techniques.
- Studying the dependence of the metal-insulator transition on film thickness and epitaxial constraints with the goal of fabricating and optimizing electric-field and strain controlled metal insulator transitions, and the negative charge transfer energy compounds Sr/Ca2CuO_3 which exhibit novel insulating phases incompatible with existing theoretical paradigms.
- Detailed study of the negative charge transfer cuprate materials, which is being studied in parallel with the nickelates. Whereas the nickelate materials can already be grown in ultra-thin-film form, the negative charge transfer materials have not yet been successfully grown in this way.

With respect to the objectives of the Joint Center,thin films of $YTiO_3$ have been grown on $SrTiO_3$ substrates. These films have been found to be ferromagnetic above a thickness of 5 monolayers. These are now being examined both experimentally as well as theoretically if there is a polar catastrophe at the interface resulting in a spin-polarized electron gas. Sandwich structures of $EuNiO_3$ have been grown on $SrTiO_3$ substrates and these have properties very different from the bulk films of $EuNiO_3$. An EXAFS study of these films is now being carried out to probe the changes in the local structure.

As a result of the Joint collaboration, several research publications are expected in the near future. This Joint Center has thus far facilitated 4 US Faculty visits to India and 1 Indian faculty visit to the US partner.

Indo-US Joint Center for Optometry and Ophthalmology

Lead Partners:
R. Krishna Kumar
Sankara Nethralaya Medical Research Foundation, Chennai
Email: kk@snmail.org

P. Sarita Soni
Indiana University, Bloomington
Email: sonip@indiana.edu

Other Partners:
K. Barun Nayak
Hinduja Hospital, Mumbai
Email:drbknayak@gmail.com

Abha Shrof
Shroff Eye Hospital, Mumbai
Email: abhashroff@hotmail.com

Shrikant Bharadwaj
L.V. Prasad Eye Institute, Kallam Anji Reddy Campus, Hyderabad
Email: bharadwaj@lvpei.org

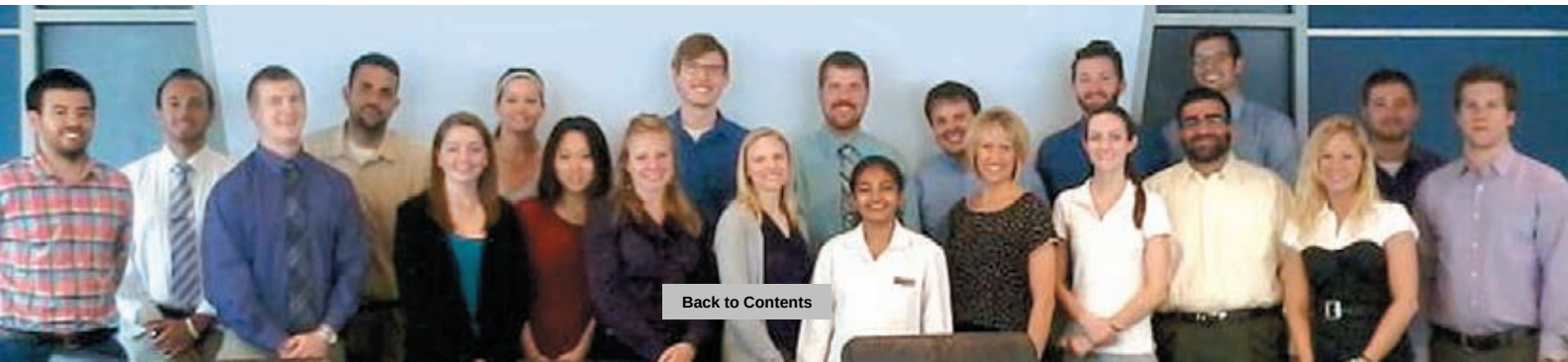
Louis B. Cantor
Eugene and Marilyn Glick Eye Institute, Indianapolis
Email: lcantor@iupui.edu

The **Joint Center on Optometry and ophthalmology** aims at building mutual understanding of the current practice of optometry and ophthalmology in India and the United States. Under the aegis of this knowledge center, American faculty and residents learn about eye care in India, differing mechanisms for delivering care, and the variety of eye diseases present. Indian physicians and optometrists are exposed to the American practice of optometry, eye care, and research and collaboration on eye care and vision research. Over the longer term, the program will build relationships that will strengthen eye care and vision research in both countries.

The objectives of this Joint Center are:

- Developing an understanding of the level of training and scope of practice of US optometrists.
- Developing an understanding of the level of training and scope of practice of Indian ophthalmologists and optometrists.
- Providing an opportunity for beneficial exchange to enhance clinical training and research opportunities and relationship-building between US and Indian eye-care providers and vision scientists.
- Developing a long-term relationship for exchange of ideas on clinical care and vision research.
- Developing collaborative research programs that span from basic to clinical and community.

Four Indian eye care professionals from four different institutions, two US Faculty and two US optometry residents have travelled to partner institutions as part of the Joint Center activities. The possible areas for collaborations include infant development, visual acuity measurements, adaptive optics and contact lens.



Back to Contents

Indo-US Joint Center for Advanced Research in Machine Learning, Game Theory, and Optimization

Lead Partners:
Shivani Agarwal
Indian Institute of Science, Bangalore
Email: shivani@csa.iisc.ernet.in

David Parkes
Harvard University, Boston
Email: parkes@eecs.harvard.edu

Other Partners:
Chiranjib Bhattacharyya
Indian Institute of Science, Bangalore
Email: chiru@csa.iisc.ernet.in

Ravindran Kannan
Microsoft Research India
Email: kannan@microsoft.com

Avrim Blum
Carnegie Mellon University, Pittsburgh
Email: avrim@cs.cmu.edu

Devavrat Shah
Massachusetts Institute of Technology, Boston
Email: devavrat@mit.edu

In today's knowledge economy, leadership positions will be occupied by countries that can handle and analyze the deluge of data that is being generated in almost every field and can transform this data into meaningful scientific conclusions. Machine learning, game theory, and optimization are three fields that are critical for analyzing and understanding large-scale data and complex systems. While each field has been studied and developed separately over the last several decades, the future lies at the intersection of these three fields, hence creating an urgent need to develop capacity at the interface. To this end, this workshop, **"Indo-US Joint Center for Advanced Research in Machine Learning, Game Theory, and Optimization"** brings together core strengths in the fields of machine learning, game theory and optimization at the Indian Institute of Science, Microsoft Research India, Harvard, Massachusetts Institute of Technology and Carnegie Mellon University in order to facilitate the highest quality research at the interface of these disciplines, and to help define the techniques that will be used to analyze data in the future. The objective of the Joint Center is to facilitate high quality research at the interface of machine learning, game theory and optimization, and to help establish long-term collaborations between Indian and US institutions in these disciplines.

Research projects awarded

The institution of the IUSSTF-supported Joint Center has led to the funding of a Project titled "New Directions

in Ranking Methods in Machine Learning (Principal Investigator: Shivani Agarwal)" by Department of Science and Technology, Government of India.

Papers published

- Maria-Florina Balcan, Avrim Blum, and Yishay Mansour.(2013) *Exploiting Ontology Structures and Unlabeled Data for Learning.* International Conference on Machine Learning (ICML).
- Avrim Blum, Anupam Gupta, Ariel Procaccia, and Ankit Sharma.(2013) *Harnessing the Power of Two Crossmatches.* ACM Conference on Electronic Commerce (EC).
- Jeremiah Blocki, Avrim Blum, Anupam Datta, and Or Sheffet.(2013) *Differentially Private Data Analysis of Social Networks via Restricted Sensitivity.* Innovations in Theoretical Computer Science (ITCS).
- Liu Yang, Avrim Blum and Jaime Carbonell. (2013) *Learnability of DNF with Representation-Specific Queries.* Innovations in Theoretical Computer Science (ITCS).

- Harikrishna Narasimhan and Shivani Agarwal (2013) *A structural SVM based approach for optimizing partial AUC.* Proceedings of the 30th International Conference on Machine Learning (ICML).
- Aditya K. Menon, Harikrishna Narasimhan, Shivani Agarwal and Sanjay Chawla (2013) *The statistical consistency of algorithms for binary classification under class imbalance* . Proceedings of the 30th International Conference on Machine Learning (ICML).
- Shivani Agarwal (2013) *Surrogate regret bounds for the area under the ROC curve via strongly proper losses.* Proceedings of the 26th Annual Conference on Learning Theory (COLT).
- Harikrishna Narasimhan and Shivani Agarwal. (2013) *SVM_pAUC^tight: A new support vector method for optimizing partial AUC based on a tight convex upper bound.* Proceedings of the 19th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD).
- Jens Witkowski and David C. Parkes. (2013) *Learning the Prior in Minimal Peer Prediction*. Proceedings of the 3rd Workshop on Social Computing and User Generated Content.
- Hossein Azari Soufiani, David C. Parkes, and Lirong Xia. (2013) *Preference Elicitation For General Random Utility Models*. Proceedings of the 29th Conference on Uncertainty in Artificial Intelligence (UAI).
- David C. Parkes and Ariel D. Procaccia.(2013) *Dynamic Social Choice with Evolving Preferences.* Proceedings of the Twenty-Seventh AAAI Conference on Artificial Intelligence (AAAI).
- M Das, S Bhattacharya, C Bhattacharyya, G Kanchi(2013) *Subtle Topic Models and Discovering Subtly Manifested Software Concerns Automatically.* Proceedings of the 30th International Conference on Machine Learning (ICML).
- Maria-Florina Balcan, Eric Blais, Avrim Blum, and Liu Yang. (2012) *Active Property Testing.* IEEE Symposium on Foundations of Computer Science (FOCS).
- Jeremiah Blocki, Avrim Blum, Anupam Datta, and Or Sheffet (2012) *The Johnson-Lindenstrauss transform itself preserves differential privacy.* IEEE Symposium on Foundations of Computer Science (FOCS).
- Pranjal Awasthi, Avrim Blum, Jamie Morgenstern, and Or Sheffet.(2012) *Additive Approximation for Near-perfect Phylogeny Construction.* International Workshop on Approximation Algorithms (APPROX).
- Maria-Florina Balcan, Avrim Blum, Shai Fine, and Yishay Mansour. (2012) *Distributed Learning, Communication Complexity, and Privacy*. Conference on Learning Theory (COLT).
- Harish G. Ramaswamy and Shivani Agarwal (2012) *Classification calibration dimension for general multiclass losses.* Advances in Neural Information Processing Systems (NIPS).
- Paul Duetting, Felix Fischer, Pichayut Jirapinyo, John K. Lai, Benjamin Lubin, and David C. Parkes (2012) *Payment Rules through Discriminant-Based Classifiers.* Proceedings of the 13th ACM Conference on Electronic Commerce (EC).
- Hossein Azari Soufiani, David C. Parkes, and Lirong Xia (2012) *Random Utility Theory for Social Choice.* Advances in Neural Information Processing Systems (NIPS).
- Benjamin Lubin and David C. Parkes (2012) *Approximate strategyproofness.* Current Science 103:1021-1032.
- S. Negahban, S. Oh and D. Shah.(2012) *Iterative ranking using pair-wise comparison.* Advances in Neural Information Processing Systems (NIPS).
- V Jethava, A Martinsson, C Bhattacharyya, DP Dubhashi (2012) *The Lovasz Theta function, SVMs and finding large dense subgraphs*. Advances in Neural Information Processing Systems (NIPS).
- A Ben-Tal, S Bhadra, C Bhattacharyya, A Nemirovski (2012) *Efficient Methods for Robust Classification Under Uncertainty in Kernel Matrices.* Journal of Machine Learning Research 13:2923-2954.

Indo-US Joint Center on Inf ammatory Bowel Diseases

Lead Partners:

Vineet Ahuja
All India Institute of Medical Sciences, New Delhi
Email: vins_ahuja@hotmail.com

Vijay Kuchroo
Harvard Medical School, Boston
Email: parkes@eecs.harvard.edu

Other Partners:

Subrat K. Acharya
All India Institute of Medical Sciences, New Delhi
Email: subratachary@hotmail.com

Narinder K. Mehra
All India Institute of Medical Sciences, New Delhi
Email: narin98@hotmail.com

Govind K. Makharia
All India Institute of Medical Sciences, New Delhi
Email: govindmakharia@gmail.com

V. Pratap Mouli
All India Institute of Medical Sciences, New Delhi
Email: pratapmouli@yahoo.com

Hanish Sharma
All India Institute of Medical Sciences, New Delhi
Email: sharma.hanish@gmail.com

Veena Tiwari
All India Institute of Medical Sciences, New Delhi
Email: veena_mishra1@yahoo.com

Amit Awasthi
Translational Health Science and Technology Institute, Gurgaon, India
Email: awasthi005@gmail.com

Vijay Yajnik
Massachusetts General Hospital, Harvard Medical School, Boston
Email: vyajnik@partners.org

Ashwin N. Ananthakrishnan
Massachusetts General Hospital, Boston
Email: aananthakrishnan@partners.org

Matthew Meyerson
Board Institute of Harvard and MIT, Cambridge
Email: mattew_meyerson@dfci.harvard.edu

Inflammatory bowel diseases or IBD (ulcerative colitis, crohn's disease) are chronic lifelong debilitating diseases with a definite morbidity and mortality rate. IBD in India has certain perplexing perspectives and simplifying those phenomenon may contribute to the global knowledge of IBD. Indians have the highest incidence of IBD in the Asia Pacific region. The current incidence rates of ulcerative colitis in India suggest that in another decade 1 million new cases of IBD will be added to the already existing burden of this disease. This suggests that in another 10-15 years India will have the largest number of IBD cases in the world.

In addition, children born of Asian Indian parents who are raised in environmentally hygienic Western societies appear to be highly prone to two diseases, ulcerative colitis and Crohn's disease.

The vision of the **Joint Center on Inflammatory Bowel Diseases** was to bring together diverse research groups to enhance translational research by inventing novel diagnostic and decision support techniques for intestinal disorders like inf ammatory bowel disease and intestinal tuberculosis. The center envisions a human translational immunology program for inf ammatory bowel diseases and intestinal tuberculosis. The basic immunological research using mice model of diseases are complemented with human clinical samples.

The major objectives of the Center are:

- Genome wide gene expression analysis for target genes to differentiate patients with Intestinal tuberculosis and Crohn's disease.
- Defining the Tim3 –Gal9 interaction in human colonic tissue and evaluating if Tim3 and Gal9 represent novel cell surface targets to modulate antimicrobial immunity and control mycobacterial infection in the intestine.
- Cytokine signatures of inflammatory micro-domains in patients with Crohn's disease and Intestinal tuberculosis with respect to Th1 and Th17 effector sets.
- Smoking and oral tobacco as an epidemiological factor for IBD.
- Pathogen sensing in granulomas of Crohn's disease.
- Resource nurturing by holding a symposium on basic immunology.
- Capacity building of the trained manpower involved in these experiments so that their respective expertise can be used as a model for elucidating translational immunological perspectives.

The Centre also organized a two day GI Immunology Symposium titled "Bridging the Clinician-Scientist Gap" on 12-13 Jan 2013 at Gurgaon. The meeting was a joint initiative of the Department of Gastroenterology, All India Institute of Medical Sciences and Harvard Medical School. The meeting provided young faculty and clinical and research fellows in gastroenterology a firsthand exposure to the fast converging field of gastrointestinal immunology. It included 170 delegates comprising of basic scientists and GI Clinicians. Five international faculty attended the meeting.

Indo US Joint Center on Thin-films and Nanostructured Emerging Coating Technologies

Lead Partners:
G.D. Yadav
Institute of Chemical Technology, Mumbai.
Email: gdyadav@yahoo.com

Other Partners:
Tapan K. Rout
Tata Steel Group R&D, Jamshedpur
Email: tkrout5@yahoo.com

Michael Chu
TAM Ceremics, New York
Email: mchu@tamceramics.net

Sarbajit Banerjee
University at Buffalo, New York
Email: sb244@buffalo.edu

The **Indo-US Joint R&D Network Center on Thin-films and Nanostructured Emerging Coating Technologies** studies scalable methods for preparation of nanostructured materials and attempts to identify and design nanostructured materials that can be composited with polymer matrices to yield corrosion-resistant multifunctional coatings. Substantial progress has been made to meet the objectives. Particular emphasis has been laid on incorporating appropriate organic additives and to functionalize the polymeric framework to impart UV-resistant properties. Specifically, the organic material, 8- hydroxyquinoline was utilized to obtain self-curing and UV protection properties. Coating methods based on layer-by-layer assembly of self-curing anticorrosive components poly(ethyleneimine), poly(methyl styrene), and 8-hydroxyquinoline on metal surfaces, have been developed . Green and sustainable coating methods have been developed by emphasizing water soluble acrylic based polymers with incorporated nanostructured materials within the coating formulations. The center continues to make excellent progress towards developing composite coating formulations based on nanostructured Mg particles.

Under the aegis of the Joint Center, two eminent US faculty visited the Indian partner institution and delivered lectures entitled “Some Adventures in Nanomaterials” and “Integrated Energy Storage Solutions on Steel”. The visit allowed for several meetings with leading researchers from both India and the United States. Additionally, the Indian PI visited US Partnering Institutions and delivered a lecture entitled “Science & engineering of pores, particles and interfaces in development of green process”.

Contact Points

Rajiv Sharma
Executive Director
Indo-US Science and Technology Forum
Fulbright House, 12 Hailey Road
New Delhi 110 001, India
E-mail: rajiv@indousstf.org

R. Varadarajan
Controller (F&A)
Indo-US Science and Technology Forum
Fulbright House, 12 Hailey Road
New Delhi 110 001, India
E-mail: varada@indousstf.org

Michael Cheetham
Director
India Science and Technology Partnership (INSTP)
American Association for the
Advancement of Science
1200 New York Avenue NW
Washington, DC 20005, USA
E-mail: mcheetha@aaas.org

Smriti Trikha
Senior Science Manager
Indo-US Science and Technology Forum
Fulbright House, 12 Hailey Road
New Delhi 110 001, India
E-mail: strikha@indousstf.org

Blair Parks Hall, Jr.
Minister Counselor
Economic, Environment and Science Affairs
Embassy of the United States of America
Shanti Path, Chanakyapuri
New Delhi 110021, India
E-mail: HallBP@state.gov

Nishritha Bopana
Science Officer
Indo-US Science and Technology Forum
Fulbright House, 12 Hailey Road
New Delhi 110 001, India
E-mail: nbopana@indousstf.org

Indo-US Science and Technology Forum (IUSSTF)
Fulbright House, 12 Hailey Road
New Delhi 110 001, India
Phone: 91-11-42691700
Fax: 91-11-23321552

http://www.indousstf.org