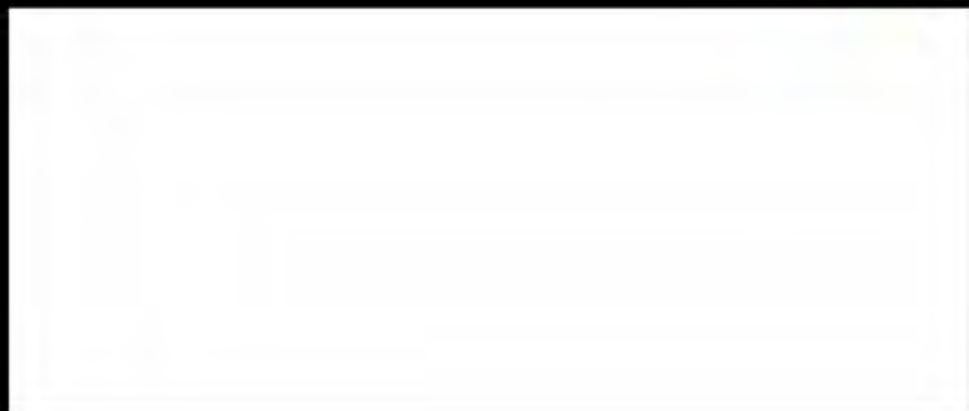
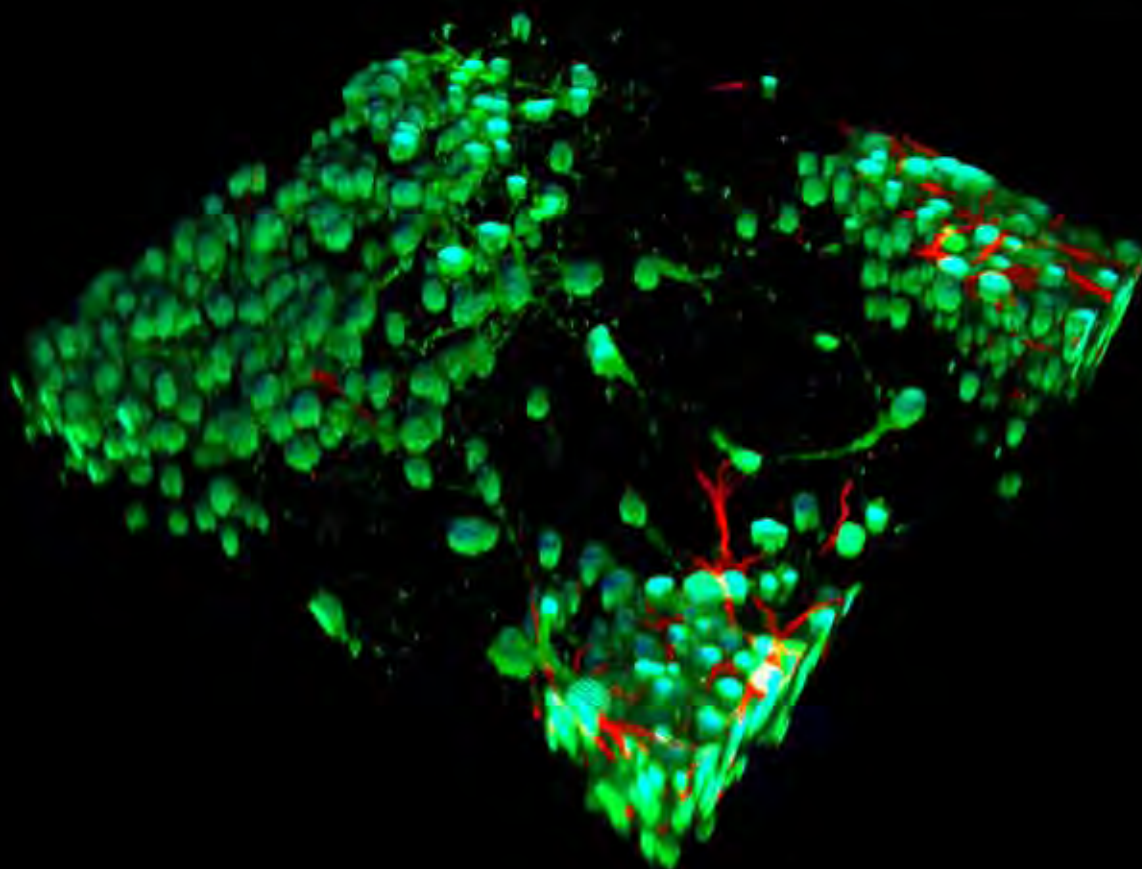


Re-Engineering Engineering Education

BIOMATERIALS FORUM!

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Indo-US Joint Center for Biomaterials for Healthcare

Special Interest Group News

Christopher Siedlecki, *Special Interest Group News*

Contributing Editor

Lakshmi Nair, *Orthopaedic Biomaterials Special*

Interest Group Reporter

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In the last few decades, materials for biomedical applications have received greater attention in the scientific community, primarily due to the fact that suitably designed biomaterials have the capability to replace, reconstruct and regenerate human/animal body tissues for long term use, without many toxic or inflammation effects. Biomaterials, as well as their applications as artificial organs, are therefore recognized as part of an emerging area for material scientists, biotechnologists, chemists, engineers and medical professionals. Traditionally, biomaterials have been created by largely trial and error processes. For example, titanium was initially considered for orthopedic applications since it is light weight and strong (clearly important for artificial joint applications). This approach has sufficed to date to help restore organ function and at least partially return a quality of life to persons suffering from various diseases. However, all of the implants currently used today to treat body ailments (from orthopedics to vasculature) have limited lifetimes and often do not last as long as the lifetime of the patient. Clearly, approaches other than 'trial and error engineering' are needed to design even better implants for the coming generations.

For these reasons, Indo-US Public-Private Networked R&D Center on Biomaterials for Healthcare was established in November 2008, with Dr. Bikramjit Basu as Director and Dr. Thomas Webster as co-Director. With the participation of two academic institutes from India (IIT Kanpur and IIT Bombay) and three from USA (Brown University, University of Texas, San Antonio and University of Washington, Seattle) as well as two national research labs from India (National Metallurgical Laboratory, Non-Ferrous Technology Development Centre) and one private company from USA (Shaping Concepts, LLC), this center is the largest of all the Indo-US research centers that are currently funded by Indo-US Science and Technology Forum. Innovative Center projects include mimicking the natural chemical and nanostructure of natural tissues to create improved biomaterials to developing sensors which can determine in real time *in situ* events surrounding implants to ensure their success.

In particular, the Indo-U.S. Center for Biomaterials for Healthcare aims to combine innovative material science concepts (including nanotechnology) with biological science approaches to develop implants that can last the lifetime of the patient and return that patient to the lifestyle to which they were accustomed before they suffered from a medical ailment. The focused activities for the Center are in the following areas: (i) metals, ceramics and polymer-based hard tissue replacement (orthopedic implant) materials, with

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particular emphasis on nano-biomaterials; (ii) polymer based scaffold materials for tissue engineering applications; and (iii) strategy formulation based on novel manufacturing routes to produce complex shaped implant materials.

With more than twenty exchange visits of senior researchers and young doctoral students between India and the USA, this center has worked toward achieving the overall objective to combine the cutting edge technologies of fabrication and testing of materials science with the knowledge of biological sciences in order to formulate strategies to develop shaped implant materials for the purpose of the enhancement of public health. Over the span of close to two years since its inception, the center has demonstrated a synergistic flow and utilization of scientific concepts, technological ideas and expertise in an international team of recognized scientists from India and the USA.

Some of the notable achievements include, a) understanding genotoxicity and gene profiling of osteoblast cells treated with HA-based nanobioceramic composites; b) development

of polymer-based scaffold materials for cartilage tissue engineering application; c) injection molding of polymer-ceramic hybrid biocomposites; and d) investigating a CAD/CAM-based manufacturing route as well as 3D printing route to fabricate complex shaped implant materials.

The Center Directors are assisted by principal investigators from the University of Washington (Dr. Rajendra K. Bordia), the University of Texas at San Antonio (Dr. Mauli Agrawal), Shaping Concepts, LLC (Dr. Animesh Bose), IIT Kanpur (Drs. Dharendra Katti and Ashok Kumar), IIT Mumbai (Dr. Rinti Banerjee), NFTDC (Dr. Krishnamurty Balasubramanian) and NML (Dr. Arvind Sinha). The nodal coordinator of the center is Prof. S. P. Mehrotra, IIT Kanpur.

All the research activities of the center are described on the website (http://www.iitk.ac.in/indo_us_biomaterials/) and the forum is funded by Indo-US Science and Technology Forum (www.indoustf.org/).



Bikramjit Basu with Center faculty members and researchers from the Department of Biomedical Engineering at the University of Texas, San Antonio.

Members in the News

Chapter News

Contributed from Press Release

Congratulations to:



Dr. Michael V. Sefton, University Professor and Michael E. Charles Professor of Chemical Engineering at the University of Toronto, who has been awarded the 2011 Acta Biomaterialia Gold Medal. The award recognizes excellence and leadership in biomaterials research and practical applications. Professor Michael V. Sefton is being recognized for his leadership in biomaterials, biomedical engineering and regenerative medicine. His many accomplishments include the establishment of the Toronto Tissue Engineering Initiative and the Canadian Regenerative Medicine Network, to harness the scientific power generated by facilitating collaboration among scientists, engineers and physicians. He is a member of the Board of Directors for the Health Technology Exchange and Rimon Therapeutics Ltd., serves as a member of the Advisory Board for the Georgia Tech Emory Center for the Engineering of Living Tissues, the National University of Ireland at Galway Network for Functional Biomaterials, and the RESBIO program at Rutgers University. Dr. Sefton is a past President of the Society For Biomaterials and will receive the Acta Biomaterialia Gold Medal Award at a plenary session of the Society For Biomaterials annual meeting in April 2011.

Editor's note: Would you like to share some good news about an honor you or a colleague have received? We would love to hear from you; please email news items to kburg@clemsontech.edu.