

BIOMATERIALS FORUM



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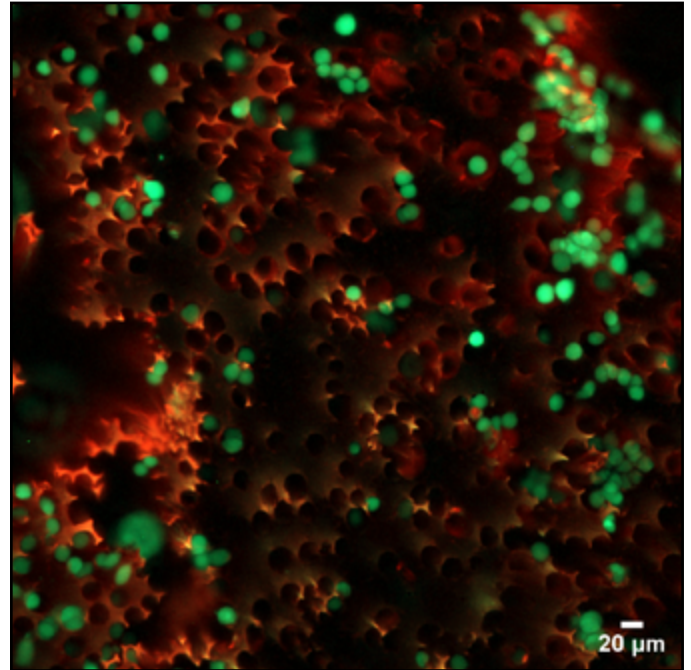
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On the cover: Fluorescence microscopy of a live/dead assay showing live green odontoblast-like cells (MDPC cell line) cultured on microtubular p(EMA-co-HEA) scaffolds (red) for 24 hours. Image provided by Drs. A. Jon Goldberg and Morteza Haeri at the University of Connecticut Health Center.



Greetings fellow biomaterials scientists,

Welcome to the news magazine of the Society For Biomaterials! Our goal is to keep you up to date on the latest activities within our Society and within the broader biomaterials community. Here's a sampling of what you'll find within this issue:

- Announcements of prestigious professional awards, advancements and relocations of our SFB members. See Member News on page 7.
- Student activity news describing student recruitment and outreach events. See Student Chapter News on page 16.
- An indispensable contribution from our Education SIG in this issue regarding "Core Content" for an introductory biomaterials course. This article on page 12 in the Education News section discusses how to provide sufficient breadth and depth to a broad spectrum of students, which addresses one of the most challenging aspects of teaching biomaterials and biomedical engineering.
- An overview of the latest mergers and acquisitions and other notable corporate decisions, as well as highlights of policy decisions being made in this country and others that may affect your ability to conduct business. See Industrial News on page 14.

- Extensive book review content just in time for the dark days of winter reading! Editor Lynne Jones has compiled an impressive list of 2013 publications by SFB members. Congratulations and thank you to all the authors who contributed time and energy and expertise to keep our field at the forefront of the literature. There's also an extensive book review of a new Regenerative Engineering text, as well as tables of contents from a few more biomaterials books that I think you'll find interesting and informative.

As I hope you can see, we've put together a broad range of biomaterials news that reflects the diversity of our SFB membership.

Best wishes,

Biomaterials Forum Executive Editor
University of Connecticut Health Center

Help us to make sure this publication reflects news of interest to you: I invite you to prepare a biomaterials/medical device-related article or opinion piece and send it to me at Lkuhn@uchc.edu for inclusion in a future issue of the *Biomaterials Forum*.

SOCIETY FOR BIOMATERIALS OFFICER NOMINEES

Please remember to vote for SFB's 2014-15 officers.

Biosketches and mission statements from the candidates will be available for viewing in the Members Only section of the SFB website.

GOVERNMENT NEWS

Due to the federal government shutdown, Government News Contributing Editor Girish Kumar was unable to gather the information needed for his column. He regrets that it will be missing in this issue. Thank you for your understanding.



As we look forward to 2014 and beyond in this issue of the *Forum*, I would like to update the Society on our long range plan that has been in the works since 2011, when Dr. Joel Bumgardner and his Long Range Planning Committee initiated a significant undertaking for the future of the Society. This was continued in 2012 by the committee under the guidance of our President, Dr. Tony Mikos. This year's committee includes Joel Bumgardner, Shrojal Desai, Elizabeth Cosgriff Hernandez, Margaret Kayo, Sachin Mamidwar, Michele Marcolongo, David Puleo, Ann Salamone, Jan Stegmann and Tim Topoleski. Our overall goal is to continue the outstanding efforts of Joel and Tony by reviewing and updating the plan as well as prioritizing and beginning implementation of this plan. The four areas of focus include Visibility/Public Relations, Education and Professional Development, Membership and Meetings. Below, I highlight the current Long Range Planning Committee discussions and the plans we have identified as a priority for implementing in each of these areas in the coming year.

Visibility/Public Relations

I will be appointing a task force to consider how to improve the Society's image nationally and internationally by considering the generation of press releases for reporting on cutting-edge topics at our annual meetings, as well as our Society members' awards and outstanding accomplishments. Importantly, we need to consider reaching out not only to members of our Society and other societies but also to the "lay public," letting them know who we are and what we do. To continue updating



and keeping up with the times, we are already undertaking a significant SFB website redesign, and a task force has been created to add a number of new items, including our news releases, webinars, videos of instructional materials or other resources.

“As you may be aware, our Biomaterials Days at various universities have been quite successful. This is undoubtedly one of the most successful new initiatives in the past 10 years.”

Education and Professional Development

We are engaging our Special Interest Groups (SIGs), as a means of trying to identify new members as well as offering free memberships to join a SIG. We are not receiving enough manuscripts for some of our awards, and thus we are engaging our committees to consider other options to encourage our graduate and undergraduate students, postdoctoral fellows or interns to submit manuscripts for our annual meeting awards. As you may be aware, our Biomaterials Days at various universities have been quite successful. This is undoubtedly one of the most successful new initiatives in the past 10 years. The program, in its fifth year, will continue and we plan to expand it. However, it is believed that we need to have industry participation in these events, not only with financial support but perhaps by developing industry chapters and, finally, mentoring our students with regard to career development. We are asking our committees to consider other innovative means for engaging our students, and one idea that has been brought forth is a Student Design Competition, similar to our recently successful Education Challenge at last year's meeting in Boston.

(Continued on next page)

Membership

Increasing membership has always been a huge concern. The Society is struggling with ways to increase our membership, develop a strategy to have valued membership in our Society as well as a sustained membership. A number of ideas have been proposed, and charges such as evaluating concerns regarding effective ways to keep registration and membership fees at lower costs have been made to our various committees to further pursue them. Changes in membership rates, as related to our meeting registration, are being considered, as well as other incentives, such as members-only access to our webinars/videos or a free SIG membership invitation.

Meetings

This is an important area as our annual meeting is not only a major source of revenue but is THE event of the year. For many of us, it's the place to hear cutting-edge science in biomaterials research as well a chance to network, exchange ideas and meet new and old colleagues. There have been many suggestions on how to improve our meetings based on your surveys and we will charge our committees to respond to these suggestions by trying different approaches, such as seeking synergies with other societies, having meetings at more cost-effective places and keeping overall meeting attendance costs low. We need to consider not only where, but what type of meeting we should be holding for the annual meeting. In addition, we will be making charges to our Program, Meetings, Devices/Materials and Awards Committees to engage our sponsors and indicate to them the value and need to be at our meetings. We need to target local universities as well as local corporations well in advance of the annual meetings. Industry members on the Program Committees have increased in the past years, and for the next few years there will be two co-chairs for each meeting—one each from academics and industry.

In summary, we have a number of interesting ideas and proposals to put forth in the coming years. While I'm not sure that they all can be done in the next year, this is the idea of a Long-Range plan. I encourage you to actively participate in making our Society a strong and vibrant organization. We need to hear from you through your participation in our surveys, response to requests for opinions from our Member-At-Large and, most importantly, your active involvement in the Society. As mentioned in my Vision Statement a year ago, this is my Society and I hope that it is also yours.

Thank you, and I look forward to working with you next year.

Nicholas P. Ziats, Ph.D.
Case Western Reserve University
President-Elect

Advances in Tissue Engineering

Rice University

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Tissue Engineering,
BioScience Research Collaborative,
Institute of Biosciences and
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- **Plastic surgery**
- **Reconstructive surgery**
- **Gene therapy**
- **Nanobiotechnology**



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Hello from Society For Biomaterials headquarters! The Society's Board of Directors and governing Council met on November 21, 2013 in Chicago, Ill. The following is an update of committee activity and new directions for 2014 discussed and decided upon during those meetings.

Awards, Ceremonies and Nominations – Chair Nicholas Peppas

The committee has reviewed a great pool of candidates for the 2014 officer slate and the 2014 awards. Staff is notifying the recipients and collecting information, and will publish the results in the first quarter 2014 issue of *Biomaterials Forum*. In addition, Council approved a motion from the committee to extend the deadline for receipt of manuscripts from the Student Awards for Outstanding Research and the Hospital Intern nominations to the second week in October, allowing for more time to prepare after the summer break.

Bylaws – Chair Jiro Nagatomi

The committee is discussing changes to the Board structure that might allow for extending the terms of the Presidency, or adding additional members at large, but will seek additional input from Council and the membership before proposing any bylaws amendments.

Devices & Materials Committee – Chair Andy Doraiswamy

The committee is encouraging revisions to the disclosure practices of presentations made during the annual meeting, and has recommended that a self-guided tutorial on “what to disclose” be a requirement upon acceptance of an oral presentation assignment. The committee will be working to further develop this idea and will present additional information for approval at the spring meeting, with adoption to be executed in conjunction with the 2015 annual meeting. There may be some additional guidance prepared in time for the 2014 annual meeting session moderators.

Education and Professional Development – Chair William Murphy

The committee reviewed a record number of applications for Biomaterials Days grants and recommended six applicants to Council: Rice/Texas A&M/Univ. of Texas, Georgia Institute of Technology, Univ. of Washington, Univ. of Kentucky/Purdue/Case Western, Univ. of Florida, and the Univ. of South Dakota. These six were approved to receive the 2014 Biomaterials Days grants. This is one more grant than has been given in years past.

The committee is supporting the second Biomaterials Education Challenge in which student chapters will compete in creating study modules aimed at eighth grade science students. SFB students will design outreach materials including instructions to eighth grade science teachers, materials for handouts and ideas for introducing the subject of biomaterials. The chapters will then be encouraged to work with local schools in implementing the study modules. Details are available on the 2014 meeting website.

The committee also continues to work selecting the recipients for the Student Chapter Awards and the C. William Hall Scholarship, as well as the STAR awards. Finally, the committee is sponsoring a Seminar for Women in BME Leadership at the 2014 annual meeting. More information is available on the SFB website.

Finance – Chair Lisa Friis (David Kohn reported at the meeting)

There is more than half a year's operating expense in the Long Term Reserve Fund, and about as much in the operating reserve. With total reserves in excess of \$1.4 million, the Society will be investing in several new initiatives in 2014, including the launch of a new website, the expansion of membership, offering all members one free Special Interest Group membership, and the inclusion of membership dues with meeting registration.

Liaison – Chair Dave Puleo

The Liaison Committee received several requests for support of MRS symposia and has developed a proposal to the MRS to formalize collaborations on an ongoing basis. A joint task force is also being formed with TERMIS-NA to discuss possibilities for co-locating future meetings.

Long-Range Planning – Chair Nicholas Ziats

The long range plan that was adopted in 2013 is being implemented, and charges have been made to several committees. On the organizational level, SFB will be evaluating its stature on the public stage, and looking for ways to increase its reach and expand its membership. A complete report on the status of implementation and plans for the future will be a featured article in the next issue of the *Forum*.

Meetings – Chair Antonios Mikos

The committee is considering options for a 2016 event, such as a small symposium with a narrow focus at a university, or a possible collaboration with an existing event. A recommendation will be made to Council in the spring of 2014.

Membership – Chair Horst von Recum

The current membership stands at 1,187, with 351 new members having joined since January 2013. Membership figures have increased from the low level during the World Biomaterials Congress year, but have not shown growth over other non-congress years. Several initiatives are underway to increase membership, including recruitment campaigns at Biomaterials Days, other society meetings and including membership as a component of meeting registration, effectively eliminating the “non-member” registration category. Increasing membership and abstract submissions have been identified as the main strategic goals for the Society in the coming year.

2014 Program – Chair Joo Ong

A total of 874 abstracts were submitted for the SFB 2014 Annual Meeting in Denver, Colorado, April 16-19, 2014. Abstracts are currently in review, with the final determination to be made at the program planning meeting on January 14, 2014. The final program book is being completely overhauled for 2014 to make all of the information easier to find and the program easier to follow. In addition, for the second year, the Program Committee will be soliciting LATE BREAKING abstracts for poster presentation only. The late breaking abstract submission period will be at the end of January 2014, with a February 3 submission deadline.

Publications – Chair Alan Litsky

Social Networking: SFB’s LinkedIn site has 4,074 members and the Facebook fan page has 926 “likes.” Efforts will be made to give more advance publicity to the meeting in Denver by using these and other social media.

Biomaterials Forum (Editor Liisa Kuhn): To continue to provide content of technical interest, the SIG *Forum* editors are now on a schedule to submit articles to the Forum, thanks to help from SIG chair Steve Little and headquarters staff Leslie Clark. The valuable content of previous issues of the *Forum* is currently not searchable. Research continues on what the cost and process would be to have past issues indexed. A simple search function would be sufficient. This would build on the accessibility to Society-based information, which increased when meeting abstracts were made searchable. More interviews and “where are they now” articles are being planned. The cost of increasing color content within the *Forum* was discussed. For now, due to the projected significant cost increase, links to online content in color will be provided instead of printing in color.

Website (Editor Tom Webster): Development of a new Society website is underway with a projected launch in March of 2014. The new website will feature enhanced member profiles and more interactive community features, including communities for each SIG and committee. In addition, new content is being

requested from all academic institutions with biomaterials programs, so that SFB can begin to feature throughout the year the research being done by members.

Book Series (Editor Jeffrey Hubbell): The first book should be published in time for the 2014 annual meeting. Additional titles are in various stages of production, and volunteers are still being sought for more books for the series. Please contact SFB headquarters if you have an idea for a book in the biomaterials field!

Biomaterials Bulletin (compiled by Multibriefs): Just over a year ago, the Society announced the new emailed newsletter, the *Biomaterials Bulletin*. It continues to be a convenient resource for disseminating announcements and distilling a compilation of relevant articles about the field of biomaterials from across the Internet.

Abstracts: The Publications Committee will be evaluating the abstract submission and review system after the annual meeting, with a critical eye toward methods to improve the system or to replace it with a competing alternative.

Special Interest Groups – Representative Steve Little

The Society now has a 14th Special Interest Group focused on “Immune Engineering,” and the Implant Pathology SIG has changed its name to the Biomaterials-Tissue Interaction SIG to better reflect the scope of its interests. In addition, the Board of Directors has approved a motion from the SIGs to offer one free SIG membership to each SFB member. Additional SIGs will still incur a \$10 fee, but because so much of a member’s interaction and involvement happens at the SIG level, the Board agreed that at least one SIG for each member was a requisite of membership.

If you have any questions, require any information or have suggestions for improved services, please feel free to contact the Society’s headquarters office:

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Hello to all Society members! It is my pleasure to highlight some of the recent accomplishments of our colleagues in this column. As you will see, SFB members have been remarkably active and have been recognized in a variety of ways. I hope this forum helps you

keep in touch with what is happening in our community, and to see how our membership is impacting the field. Many thanks to all of those who sent me information for this column, and please send me your news for future issues (send to jpsteg@umich.edu).

Honors and Awards

Dr. Kristi Anseth was honored with the 2013 American Institute of Chemical Engineers (AIChE) James E. Bailey Award for Outstanding Contributions to the Field of Biological Engineering. This award is presented to an individual “who has had an important impact on biological engineering and whose achievements have advanced the profession.” Dr. Anseth is a Howard Hughes Medical Institute Investigator and Distinguished Professor of Chemical and Biological Engineering at the University of Colorado, Boulder.

Dr. Bikramjit Basu received the very prestigious 2013 Shanti Swarup Bhatnagar Award in Engineering Sciences at the Foundation Day of the Council on Scientific and Industrial Research in September 2013 in New Delhi, India. This award is national recognition for young scientists and engineers for their R&D work done in India. Dr. Basu was also elected as a Fellow of National Academy of Sciences, India, which is the oldest science academy in India. Dr. Basu is Associate Professor in the Materials Research Center at the Indian Institute of Science in Bangalore, India.

Dr. Ashutosh Chilkoti received the 2013 Pritzker Distinguished Lecturer Award from the Biomedical Engineering Society (BMES). This award recognizes an individual’s outstanding achievements and leadership in the science and practice of biomedical engineering, and Dr. Chilkoti gave a keynote address at the BMES Annual Meeting in Seattle. Dr. Chilkoti is Theo Pilkington Professor of Biomedical Engineering and Director of the Center for Biologically Inspired Materials and Material Systems at Duke University in Durham, N.C.

Dr. Larry Hench is the recipient of the 2014 Acta Biomaterialia Gold Medal award, which recognizes excellence in research and development in the field of biomaterials. Dr. Hench was honored for his pioneering work in discovering Bioglass, a family of bioactive glasses that have tissue-bonding properties. These materials are now used widely in the clinic, and have made a particular impact in orthopaedic and dental repair applications. Dr. Hench has been a leader in the field of bioceramics and is a member of the National Academy of Engineering.

He is currently a University Professor of Biomedical Engineering in the Florida Institute of Technology College of Engineering, as well as Director of the Florida Tech Center for Medical Materials and Photonics.

Dr. Patrick Hsieh was cited as a “Top Junior Translational Researcher” by Nature Biotechnology. Dr. Hsieh works in the areas of nanobiotechnology and regenerative medicine, and has six patents in these areas. He is an Associate Research Fellow jointly appointed at the National Cheng Kung University and the Academia Sinica.

Dr. Robert Langer is the recipient of the 2013 Julio Palmaz Award for Innovation in Healthcare and the Biosciences, presented by BioMed SA. This award recognizes Dr. Langer “as the most cited engineer in the world and one of the most prolific medical inventors in history ... [who has] played a pioneering role in advancing multiple technologies, working at the intersection of academic research and the commercial market with transformational results.” Dr. Langer is the David H. Koch Institute Professor in Chemical Engineering at MIT. He is a standing member of SFB and received the 2013 SFB Founders Award.

Dr. Bingyun Li was awarded the 2013 Asia Pacific Orthopaedic Association (APOA)-Pfizer Best Scientific Paper Award at the APOA conference in Kuching, Malaysia. Dr. Li and his team received the award for their publication titled “Intra-cellular Staphylococcus aureus alone causes infection in vivo,” published in *European Cells & Materials*. The APOA-Pfizer Best Scientific Paper Award is given every two years. Dr Li is an Associate Professor in Department of Orthopaedics and Director of the Biomaterials, Bioengineering & Nanotechnology Laboratory at West Virginia University.

Dr. Gopinath Mani received the 2013 President’s Award for Research Innovation and Entrepreneurship from the University of South Dakota. This award recognizes professional accomplishments, and further requires demonstrated innovative thinking or research findings that have promising commercial potential, as well as a concept that has progressed beyond the theoretical stage to the applied stage. Dr. Mani is an Assistant Professor at the University of South Dakota.

Dr. Alison McGuigan received the Young Investigator Award from the Americas Chapter of the Tissue Engineering and Regenerative Medicine International Society (TERMIS). This award is for demonstrated outstanding achievements within the tissue engineering and regenerative medicine field, and the individual is selected based on publications within a particular area of research. Dr. McGuigan is an Assistant Professor in the Department of Chemical Engineering & Applied Chemistry at the University of Toronto.

Dr. Robert Nerem was honored with the Lifetime Achievement Award from the Americas Chapter of the Tissue Engineering and Regenerative Medicine International Society (TERMIS). This award recognizes “an individual who has contributed immensely to the tissue engineering and regenerative medicine field ... [and] whose work has impacted and assisted with laying the foundation stones for the field.” Dr. Nerem is Professor Emeritus at the George W. Woodruff School of Mechanical Engineering, Director of the Georgia Tech & Emory Center for Regenerative Medicine, and Parker H. Petit Distinguished Chair for Engineering in Medicine and Institute Professor at the Georgia Institute of Technology in Atlanta, Ga.

Dr. Nicholas Peppas has been selected for the 2014 American Chemical Society (ACS) Award in Applied Polymer Science, which recognizes outstanding achievements in the science or technology of plastics, coatings, polymer composites, adhesives, and related fields. Dr. Peppas was honored for his pioneering work on the development and implementation of polymer networks and hydrogels for biomedical applications, and the award will be presented at the ACS National Meeting in Dallas TX in March 2014. Dr. Peppas is a longstanding member and past President of SFB, and has received the Clemson Award, Founders Award and the C. William Hall Award from the Society. He is the Fletcher Pratt Chaired Professor and Department Chair in Biomedical Engineering at the University of Texas at Austin.

Dr. Rameshwar Rao received the Mary Ann Liebert, Inc. Outstanding Student Award from the Americas Chapter of the Tissue Engineering and Regenerative Medicine International Society (TERMIS) for his research accomplishments in the fields of tissue engineering and regenerative medicine. The award is based on a submitted manuscript titled “Dual-Phase Osteogenic and Vasculogenic Engineered Tissue for Bone Formation” that will be published in *Tissue Engineering Part A*. Dr. Rao did his PhD in Dr. Jan Stegemann’s lab in the Department of Biomedical Engineering at the University of Michigan, and he is now a first year medical student at the University of Michigan.

Dr. Buddy Ratner was presented with the 2012 George Winter Award from the European Society for Biomaterials at the Annual Conference in Madrid, Spain. This award recognizes an individual who has “contributed significantly to knowledge in the field of biomaterials and/or material controlled or influenced reactions within the host body through basic, experimental and/or clinical research.” Dr. Ratner is a past President of SFB and has received the Clemson Award, Founders Award, and the C. William Hall Award from the Society. He is a Professor of Bioengineering and Chemical Engineering, as well as the Darland Endowed Chair in Technology Commercialization at the University of Washington, Seattle.

Dr. Mark Saltzman was selected to give the 2013 NIH National Institute of Biomedical Imaging and Bioengineering (NIBIB) Lecture at the 2013 BMES Annual Meeting in Seattle WA. This award recognizes an NIBIB grantee who has made particularly significant contributions through their NIBIB-sponsored research. Dr. Saltzman is Chair of Biomedical Engineering and Goizueta Foundation Professor of Chemical & Biomedical Engineering at Yale University in New Haven CT.

Dr. Mark Tibbitt received the 2012 Outstanding Biomaterials Thesis Award from the Association of Supporters of the Max Bergmann Center of Biomaterials in Dresden, Germany. Dr. Tibbitt’s work explored the use of photoresponsive polymer hydrogels with spatially and temporally tailored properties to better understand how cells send and receive information from their microenvironment. Dr. Tibbitt performed his graduate work in Dr. Kristi Anseth’s lab at the University of Colorado, Boulder, and he is now a postdoctoral fellow at MIT.

Dr. Bill Wagner was honored with the Senior Scientist Award from the Americas Chapter of the Tissue Engineering and Regenerative Medicine International Society (TERMIS). This award recognizes significant contributions to the tissue engineering and regenerative medicine field from an investigator active in the field whose contributions as a body of work are well recognized within the community. Dr. Wagner is Director of the McGowan Institute for Regenerative Medicine as well as a Professor of Surgery, Bioengineering and Chemical Engineering at the University of Pittsburgh.

2013 Fellows of BMES

The SFB would like to congratulate these members on being inducted as Fellows of BMES:

Dr. Ashutosh Chilkoti, Duke University
Dr. Jane Grande-Allen, Rice University
Dr. Shelly Sakiyama-Elbert, Washington University in St. Louis
Dr. Thomas Webster, Northeastern University
Dr. Joyce Wong, Boston University

Other news and recognitions

Professor Ravi V. Bellamkonda was named the Wallace H. Coulter Professor and Departmental Chair in Biomedical Engineering for Georgia Tech/Emory effective July 2013. He directs the Neurological Biomaterials and Cancer Therapeutics Laboratory, a part of the Laboratory for Neuroengineering in the joint Georgia Tech/Emory Coulter Department of Biomedical Engineering. He also serves as associate vice president within the Office of the Executive Vice President for Research (EVPR), directs a T32 training grant called Rational design of Biomaterials, directs a Graduate Leadership Program for BioE/BME graduate students and is a Georgia Cancer Coalition Distinguished Scholar.

Dr. Jangwook Jung was awarded a postdoctoral fellowship from the American Heart Association working in Dr. Brenda Ogle's lab, which has recently moved to the University of Minnesota, Twin Cities. The grant is titled "Directed cardiomyocyte differentiation by 3D ECM composites" and will probe the impact of 3D ECM-based matrices on cardiomyogenic differentiation of iPS cells.

Dr. Nihar Shah will serve as the principal investigator for a Phase 1 Small Business Innovation Research (SBIR) grant to translate novel biodegradable polymers of naturally-derived polyphenolic antioxidants into formulations for treating oral mucositis (OM). Dr. Shah is a post doctoral scholar at the University of Kentucky and Director of Research at Bluegrass Advanced Materials LLC, a startup company founded by Dr. Thomas Dziubla and Dr. Zach Hilt from the Department of Chemical Engineering at the University of Kentucky.

Poly-Med, Inc. announced the issuance of two new U.S. patents. The first (U.S. #8,506,988) deals with an intravaginal ring delivery system that can be used for the intravaginal, intraperitoneal and subcutaneous delivery of at least one bioactive agent. The inventors on this patent are SFB members **Dr. Shalaby W. Shalaby** (Deceased) and **Georgios T. Hilas**. The second patent (U.S. #8,507,614) relates to the preparation of a lactide-based copolymer especially useful for delivery directly to the tissue lining of body cavities. Potential applications include bacteria- and yeast-infected vaginal canals, esophagi and arteries following angioplasty. The inventors on this patent are SFB members **Drs. Shalaby W. Shalaby** (Deceased), **Michael Scott Taylor**, and **Shawn J. Peniston**.

Dr. Chandra P. Sharma participated in founding the Asia Pacific Society for Artificial Organs at the 5th Congress of the International Federation of Artificial Organs in September 2013 in Yokohama, Japan. Dr. Sharma will represent as Council member from India in this Society. Dr. Sharma is the Head of the BioMedical Technology Wing at the Sree Chitra Tirunal Institute for Medical Sciences and Technology in Trivandrum, India.

Several SFB members published papers that received broader media attention. Research on nanomaterials in restorative dentistry performed by **Dr. Tolou Shokuhfar** (Michigan Technological University) was highlighted in *Science Daily* and at

www.Physics.org, as well as through an interview on the Dentist News Network. A paper authored by **Dr. Vahid Serpooshan** in the lab of Dr. Pilar Ruiz-Lozano (Stanford University) was the focus of several media reports that appeared in *Medical Daily*, *Science Daily*, *Health Canal*, and *Med India*.

New positions

Dr. Christopher Bowman is the Director of the newly launched Materials Science and Engineering Program at the University of Colorado, Boulder. This interdisciplinary Ph.D. and M.S. program is "aimed at providing a rigorous education in materials science and engineering and the fundamental physics, engineering, chemistry and biology that underlie this discipline." Dr. Bowman is a University of Colorado Distinguished Professor, James and Catherine Patten Endowed Chair, and Clinical Professor of Restorative Dentistry at the University of Colorado, Boulder.

Dr. Warren Haggard will be assuming responsibilities as Associate Dean for Research for the Herff College of Engineering at the University of Memphis. Dr. Haggard has previously been a Professor and Herff Chair of Excellence in the Department of Biomedical Engineering at the University of Memphis, and has been active in both the industrial and academic spheres of biomaterials science

Dr. Evan Scott has joined the faculty at Northwestern University as an Assistant Professor of Biomedical Engineering. His lab applies principles from nanomaterials science, biomaterials science, surface science, quantitative proteomics and tissue engineering to address fundamental questions in immunology and to develop translational methods of controlled immunomodulation. His research has applications in the areas of cancer, vaccination, material/biological interfaces and immunobiology.

SHARE YOUR MEMBER NEWS!

Contact Jan with Member News at
jpsteg@umich.edu or 734-764-8313.



Larry Hench

Awarded the 2014 Acta Biomaterialia Gold Medal Award



Professor Hench, University Professor of Biomedical Engineering in the Florida Institute of Technology College of Engineering and director of the Florida Tech Center for Medical Materials and Photonics, specializes in bio-ceramics and is a member of the National Academy of Engineering (NAE).

A Legacy of Innovation

Born in Ohio in 1938, Dr. Hench received his bachelor's degree in 1961 and doctoral degree in 1964 in ceramic engineering from The Ohio State University. After 32 years on the faculty, Hench retired from the University of Florida as Emeritus Professor to join the Imperial College, University of London, as chair of ceramic materials. There, he co-founded and co-directed the Tissue Engineering and Regenerative Medicine Centre for 10 years.

In 1969 Hench discovered Bioglass, the first man-made material to bond to living tissues, which is now clinically used throughout the world to repair bones, joints and teeth. Prior to this discovery, all materials used in medicine or dentistry could be tolerated by the body only by forming a non-adherent fibrous layer to isolate living tissues from the foreign material.

Discoveries made by Hench and his colleagues in the 1980s and 1990s have resulted in numerous Federal Drug Administration (FDA) approvals. In the mid-'80s the FDA approved the use of bioactive glass devices to reconstruct the ossicular chain (part of the middle ear) and restore hearing. A subsequent FDA approval

led to bioactive glass implants to replace teeth, maintain jaw stability and repair maxillo-facial bone defects. In the '90s the FDA approved the use of a particulate form of bioactive glass that led to regenerating new bone to repair bone defects caused by periodontal disease. Numerous FDA-approved applications in orthopedic surgery include repair of bone defects following revision surgery of failed hip and knee prostheses, and spinal repair.

Recognitions and Awards

Hench, who has dedicated more than 40 years to his work, has earned many international awards, published 800 research papers, 30 books and has 32 U.S. patents. Twelve companies have been founded based upon technology created in Hench's laboratories and the commercial products have led to numerous advanced technology awards. He is also an author of a series of children's books featuring Boing-Boing the Bionic Cat and educational materials such as workbooks, experiment books and hands-on kits to stimulate interest in science, technology, engineering and mathematics (STEM).

Dr. Hench has chaired 13 national and international conferences and symposia. In addition to his NAE membership, he is a member of the World Academy of Ceramics and a fellow of numerous professional societies including the American Ceramic Society, Society of Glass Technology, and Institute of Materials. He is a Distinguished Life Member of the American Ceramic

Society, the Society's highest award, and has been awarded an Honorary Doctorate of Engineering by the Rose Hulman Institute of Technology.

The Acta Biomaterialia Gold Medal Award will be presented to Prof. Hench at the joint meetings of the European Society of Biomaterials and the United Kingdom Biomaterials Society in Liverpool, UK, Aug. 29 to Sept. 2, 2014, where he will give the award keynote lecture at a special symposium on bioactive materials.

About the Award

The Gold Medal Award consists of the medal, a certificate, a cash honorarium and travel expenses to attend the award ceremony. Awardees are undisputed world leaders in the field of biomaterials, whose accomplishments in discovery and translation to practice are surpassing and known to all in the field.

Acta Materialia Inc. is a non-profit organization dedicated to disseminating the knowledge of science and engineering of materials, primarily by publishing high quality journals covering the areas of materials science, biomaterials, materials engineering, materials chemistry and physics. The corporation publishes three journals in collaboration with Elsevier: *Acta Materialia*, *Scripta Materialia*, and *Acta Biomaterialia*.



Biomaterials Community

The 60th Annual meeting of the Orthopedic Research Society
March 15-18, 2014 | New Orleans, La.

The Spring Meeting of the European Materials Research Society
May 26-30, 2014 | Lille, France

Take Note!

AIMBE now offers its AIMBE Flash e-newsletter featuring important information for the biomaterials community. Learn more at aimbe.org/public-policy/flash-updates

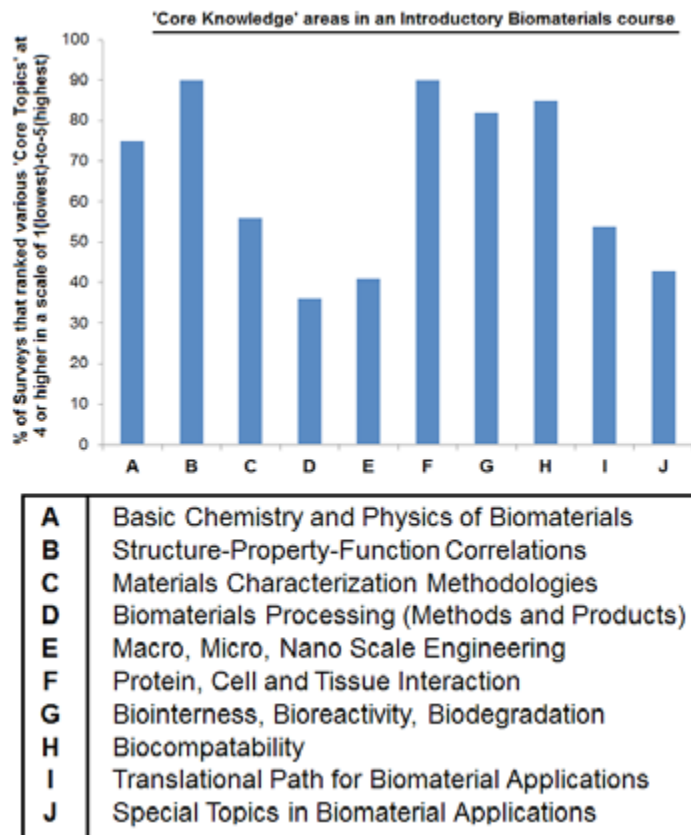
'Core Content' for an Introductory Biomaterials Course

An Education Perspective

The vast field of biomaterials has revolutionized the design and application of various biomedical systems, and is itself undergoing constant evolution in the light of newer insights gained from studying the bidirectional interactions between the host and the materials in such applications. Consequently, every institution that has research and translational focus in biomedical systems has incorporated one or more 'biomaterials-related' courses in their undergraduate and graduate curricula, to provide substantial breadth and depth in this area. The pedagogical and didactic components of these courses are often dependent on the specific 'biomaterials-related' strengths of the institution and the course instructors. In this context, an important question that often comes up in designing biomaterials-focused courses is:

What should be considered as indispensable 'core content' for an introductory level biomaterials course that can provide sufficient breadth and depth to a broad spectrum of students?

Figure 1: Rank distribution of 'core topics'



The Biomaterials Education SIG thought it would be of great value to pose this question to its members who are involved in designing and implementing such courses in their institutions. The purpose was to obtain a cumulative perspective on the matter of 'core content' and present it in the light of biomaterials design and applications. To this end, a survey was created, sent out to SFB members—many of whom have experience in biomaterials course design, as well as content development—and the data was collected over a period of several weeks.

Figure 1 provides an overall perspective that was obtained from these surveys, along with a cumulative distribution of '4 or higher' in ranking that these surveys provided to a list of 'core content' topics in a scale of 1-to-5 (1: lowest, 5: highest, in importance). As evident from the data, the topics that most instructors consider the most important in 'Biomaterials core knowledge' are:

- (a) basic chemistry and physics of biomaterials along with structure-property-function correlations in biomaterials design
- (b) protein, cell and tissue interaction with biomaterials
- (c) the contexts of biointertness, bioreactivity, biodegradation and biocompatibility.

Within the context of bioreactivity and biocompatibility, inflammatory response was considered the single-most important topic, followed closely by immune response, blood compatibility and infection (in that order if the course schedule permits). Some members also made the distinction that an introductory course at the undergraduate level should be more focused on getting students interested in biomaterials by giving examples of clinical devices, their issues and problems and their potential solutions, while successive courses at an advanced level should be utilized to actually build depth in terms of materials design and engineering for specific device applications. In contrast, an introductory course at the graduate level should incorporate the concepts of design and engineering right from the beginning. This distinction can be a topic of a very insightful and valuable discussion in future SIG meetings. The cumulative analysis of the survey data as well as our own opinion and experience in biomaterials education for many years have led to the following topics to be considered as absolutely indispensable for 'core knowledge' in an introductory biomaterials course:

1. Identify common biomaterials used for biomedical devices, sort these into classes, such as metals, ceramics, polymers and composites, and understand their innate strengths and weaknesses, as well as identify their strengths and weakness in a biomedical application perspective.

2. Identify what the physical, chemical and mechanical properties are of materials that become important in terms of biomedical applications, understand the distinction and importance of surface versus bulk properties and learn the names, acronyms and working principles of instruments techniques that are used to characterize these properties (detailed instrumentation knowledge of these methods can be part of subsequent advanced courses).
3. Distinguish between structural property and functional property of biomaterials, and understand structure property-function correlations in the context of specific biomedical applications.
4. Understand the fundamental concepts of bioinertness versus bioreactivity, and then build on this to understand very basic concepts of biocompatibility host response in the body, at the very least regarding inflammation and then, if possible, regarding toxicity, immune response and blood compatibility.
5. Be aware of the regulatory aspects of biomaterial applications in biomedical device/product development, such as FDA specifications and device classes, and the road to translation/commercialization.
6. Selected examples of clinically used medical devices to highlight the role of biomaterials in these devices and emphasize the history, failures, current challenges and potential solutions in order to provide a vision of how the biomaterials field is both revolutionary and evolutionary.

We feel that beyond these six indispensable areas, other aspects of biomaterials design and subsequent device development—for example, processing and fabrication, analysis of current research developments in the field (with written or oral reports), specific programming of biomaterials properties to elucidate specific high level functions, etc.—should be essential components of an introductory graduate level course but not necessarily for an introductory undergraduate level course. The emphasis here is in the term introductory, and we feel that the above aspects, although of substantial value in overall biomaterials education, should be part of subsequent depth-focused courses at the undergraduate level.

Currently, several textbooks are available on the diverse area of biomaterials and its applications [1-7], and these books have tried to capture the vast spectrum of this area starting from basic materials properties and characterization, to materials processing and device fabrication, to biointeractions and biocompatibility, to mechanisms of device failures and subsequent evolution of device design. These books are excellent in their content, but as a course designer/instructor, one has to be able to distinguish between the introductory versus advanced and undergraduate versus graduate levels of course objectives and outcomes, and therefore select the contents of the book as reading materials, accordingly.

Based on overall opinion, for an introductory level undergraduate course, the emphasis should be on building a broad-spectrum awareness and interest in students about biomaterials, whereas for an introductory level graduate course, the emphasis should be on deeper details of biomaterials design, processing, modification and analysis in the context of past, present and future biomedical applications. Furthermore, for undergraduate level introductory courses that are taught in engineering programs, the course design and evaluation should ensure effective quantitative assessment of ABET outcomes. We hope that our perspective is of value to readers who have educational responsibilities and interest in this area, and we look forward to continuing insightful discussions in this matter via organizing appropriate education-focused sessions in future SFB conferences.

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WE WANT YOUR OPINION!

If you have any comments or opinions about the content of this article, please send them to Executive Editor Liisa Kuhn Ikuhn@uchc.edu, who will forward them to authors.

Industrial News

A new valve used to restore vocal function to patients with throat cancer uses a biocompatible yttria partially-stabilized zirconia. The valve traditionally is made from silicone rubber, which is subject to biofilm formation that results in a rapid deterioration of device performance. Patients typically must undergo an uncomfortable and costly valve replacement procedure approximately every three months. The valve design, developed by **Morgan Technical Ceramics** (MTC; Rugby UK) in collaboration with the UK-based University of Hull, reportedly significantly improves the lifetime of the speech restoration device and reduces healthcare costs. The speech restoration system will be taken to market by spin-out company **Avoco Medical Ltd**, also based in Hull.

The Malaysian Medical Device Act will have significant ramifications for the medical device industry throughout the world, according to The Star. In total, medical device export revenues

last year were more than \$4 billion in Malaysia. Under the new regulations, both small- and medium-sized enterprises (SMEs) must meet certain safety and efficacy standards for their products. Under the new regulations, Hitendra Joshi, chairman of the **Association of Malaysian Medical Industries**, believes that Malaysia can boost its reputation as a reliable producer of medtech products. "It would help attract foreign direct investment with increased market confidence," he stated in an interview. The regulations would also allow for foreign companies to enter joint ventures with local SMEs. The Association of Malaysian Medical Industries is made up of 45 different companies which account for more than half of all export revenues for medical devices.

Sanofi is the largest pharmaceutical manufacturer in France. Since 2008, the company has spent \$33 billion on partnerships and acquisitions. Chris Viehbacher, CEO of Sanofi, stated



that he plans to replenish the company's product pipeline. In addition, he wants to reduce the company's reliance on a few high-value products that could be subject to generic competition in the future. In remarks made to Bloomberg News, Viehbacher said, "The marriage of digital technologies with therapeutics is a phenomenon that is only going to grow." He continued, stating that the company could benefit from "partnerships to help us understand the digital side of the business." The latest move by the French pharmaceutical company follows similar actions by other drug makers. This month, **Pfizer** took its animal healthcare division public. Shares of **Zoetis**, the name of Pfizer's spinoff, have increased 22 percent since its IPO. While Sanofi does have its **Merial** animal health division, it has not publicly stated that it will spin off this division.

Johnson & Johnson announced the grand opening of its new Innovation Center in Cambridge, Mass. The 9,000-square-foot facility will serve as a "hotbed for life science innovation," according to the company. The grand opening for the event features life-sized statues of historical scientists, performers and caricature artists. These entertainment options were chosen to share word of the center's open-door policy. J&J hopes the facility will be used by early-stage product developers, academia and businesses. The Innovation Center will be led by Robert Urban, a leader at the **Koch Institute for Integrative Cancer Research** at Massachusetts Institute for Technology. Both Urban and J&J stated that the space will help speed up the development of pipeline technologies, but it will also be used to foster early-stage medtech and biotech startups hoping to get their innovations off the ground. Since it can be difficult for entrepreneurs to build valuable relationships on their own, experts at the J&J innovation centers will help connect people across consumer, diagnostic, medical device and pharmaceutical companies.

After the 2.3 percent medical device tax went into effect at the beginning of the year, venture capital investment in the sector has practically dried up. That is the thesis of two famed physician device developers, Thomas Fogarty and Fred Burbank, sharing their views in an op-ed in *The Wall Street Journal*. The tax, which was implemented to help cover costs associated with healthcare reform, has led major medical device companies to lay off employees or pass additional costs onto consumers. For startups, the tax, paired with the tough funding climate, can be devastating. Also complicating matters are the slow response times at the USPTO and FDA, both of which have slowed significantly in recent years. These issues are working together to "destroy startups and stunt medical-device innovation in the U.S.," the authors write, adding that it will thus harm the "quality of health care world-wide." The article concludes that the government should repeal the device tax and coerce the USPTO and FDA to "improve their turnaround time." If these changes aren't made, medical device startups "are all but doomed," they write.

While U.S. venture capital investment in medical technology may be on the decline, investment in Israel is growing at a rapid pace. During the second quarter of 2013, high-tech companies in Israel raised \$493 million, a 4 percent increase from the first quarter and a 3 percent rise from Q2 of 2012. In part, this growth was made possible by a healthy Israeli medical device industry. The Israeli medical device industry continues to grow. At the mid-year mark, the country boasted 656 medtech companies in total. Out of these 35, were traded on the stock market. The country also has one of the highest concentrations of medical device-related patents. Interestingly, much of the funding for Israeli-based projects is coming from other parts of the world. **Sony**, for instance, recently invested \$10 million in **Rainbow Medical**, an Israeli medtech incubator that focuses on stimulators and stents. While 2013 has seen the approval of several innovative medical devices, the year has also seen the decline of first-time FDA premarket approvals. During the first half of the year, FDA regulators granted nine premarket approvals. In comparison, regulators granted 19 PMAs in the first six months of 2012. However, FDA regulators did provide a humanitarian exemption for the Argus II retinal prosthesis system by **Second Sight Medical**. According to some industry analysts though, the dip in PMA approvals is evidence of an onerous regulatory environment, which is destroying jobs and strangling startups.

Following several years of drafting and review, FDA regulators issued the final unique medical device identification rule. First, the rule consists of two separate components. This includes a public FDA-run database and a unique device numbering system. The device numbering system would assign a unique number to different models of medical devices. The unique device identifier would include product-specific information like manufacturing date, expiration date, batch number and lot number. The data storage system, dubbed the **Global Unique Device Identification Database**, would serve as a reference catalog for these unique device identifiers (UDIs). The topic of UDIs will be the focus of an upcoming presentation at **MD&M Minneapolis**, where M.J. Wylie, senior director of healthcare GS1 US, will review UDI regulations and examine immediate strategies to achieve UDI compliance.

Stryker Corporation, the medical technology company based in Kalamazoo, Mich., said that it would pay \$1.65 billion for **MAKO Surgical Corporation**. The agreed price of \$30 a share represents a huge 86 percent premium for MAKO, which makes tools for robotic assisted surgery in orthopedics. "MAKO has established a compelling technology platform in robotic assisted surgery, which we believe has considerable long-term potential in joint reconstruction," Kevin A. Lobo, chief executive of Stryker, said in a statement. Stryker investors, however, did not appear to like the news. Stryker shares were down 2.6 percent in premarket trading.

Chapter Development

In early September 2013, the student chapters of the Society For Biomaterials participated in a conference call to foster the collective development of the chapters as a whole and help increase awareness of the opportunities offered by the Society For Biomaterials. Case Western Reserve University, Clemson University, North Carolina State University, Texas A&M University, UCLA, University of Texas at San Antonio, Wake Forest University and Wichita State University all called in to discuss current opportunities for the student chapters from the Society For Biomaterials (SFB), the outlook for the upcoming school year, and activities that they would like to see at the annual meeting for the Society in April. With such a diverse population of student chapters, ranging from brand new organizations to fully established groups, there was a great discussion on recruitment, fundraising, meeting ideas and Biomaterials Days.

A big emphasis this year for most student chapters was student recruitment and activity. Having students involved at every level of their education is a great way to keep the chapters active throughout the year. This is important for both established chapters and new chapters. A diversified executive board for the chapter can help bring in new undergraduate and graduate members. Recruiting people from multiple departments is also a great way to attract new members and keep participation up at events. In addition to regular meetings, other activities planned by student organizations include happy hours, faculty panel discussions, industry tours, educational challenges, camps for middle and high school students, potlucks and professional development workshops. Knowing the local companies and institutions around their schools has helped each organization plan a variety of events that combine various aspects of academia and industry, as well as foster a relationship between the two.

Biomaterials Days are a great way to involve the community in a student organization. These events highlight research done by students and attract members in the academic, industry and government community surrounding the area. The events typically feature a keynote address, research presentations, exhibits, panel discussions and a networking session. Each year the SFB awards grants supporting Biomaterials Days for various student chapters. Student chapters from different universities are encouraged to collaborate with each other to develop comprehensive and regional Biomaterials Days. This allows for a wider platform for biomaterials education, research and networking. With 28 student chapters throughout the country, we hope to see even more Biomaterials Days in 2014 around the country.



Recent Biomaterials Days

October 26, 2013:

at Case Western Reserve University; jointly hosted by Case Western Reserve University, University of Kentucky and Purdue University

November 1-2, 2013:

Clemson, in celebration of the 50th anniversary of Clemson Bioengineering

BE THERE!

Be sure to visit www.biomaterials.org, or check out the SFB calendar, LinkedIn group and Facebook page for upcoming Biomaterials Days in your area.



X

Montréal, Canada

Where will you be in
2016?



WBC2016

10th World Biomaterials Congress
May 18-22, 2016 | Montréal, Canada

WBC2016.org

Regenerative Engineering

Cato T. Laurencin and Yusuf Khan, Editors
Boca Raton, Fla.: CRC Press; 2013
ISBN: 978-1-4398-1412-3
417 pages

Regenerative Engineering is considered by many to be the next stage in the evolution of tissue engineering. While tissue engineering focuses on the ability to stimulate or enhance repair of a specific tissue, the goal of regenerative engineering is to “regenerate” tissues and, ultimately, intricate organ systems. This requires a multidisciplinary strategy integrating the biological principles involved in cell biology (proliferation, differentiation, signaling), morphogenesis, wound healing, and disease pathology with biomaterials science, biomechanics and tissue engineering. The most complex example, regeneration of limbs, involves the interplay between all of the major systems of the body including (but not limited to) the musculoskeletal, cardiovascular, nervous, endocrine and the integumentary systems.

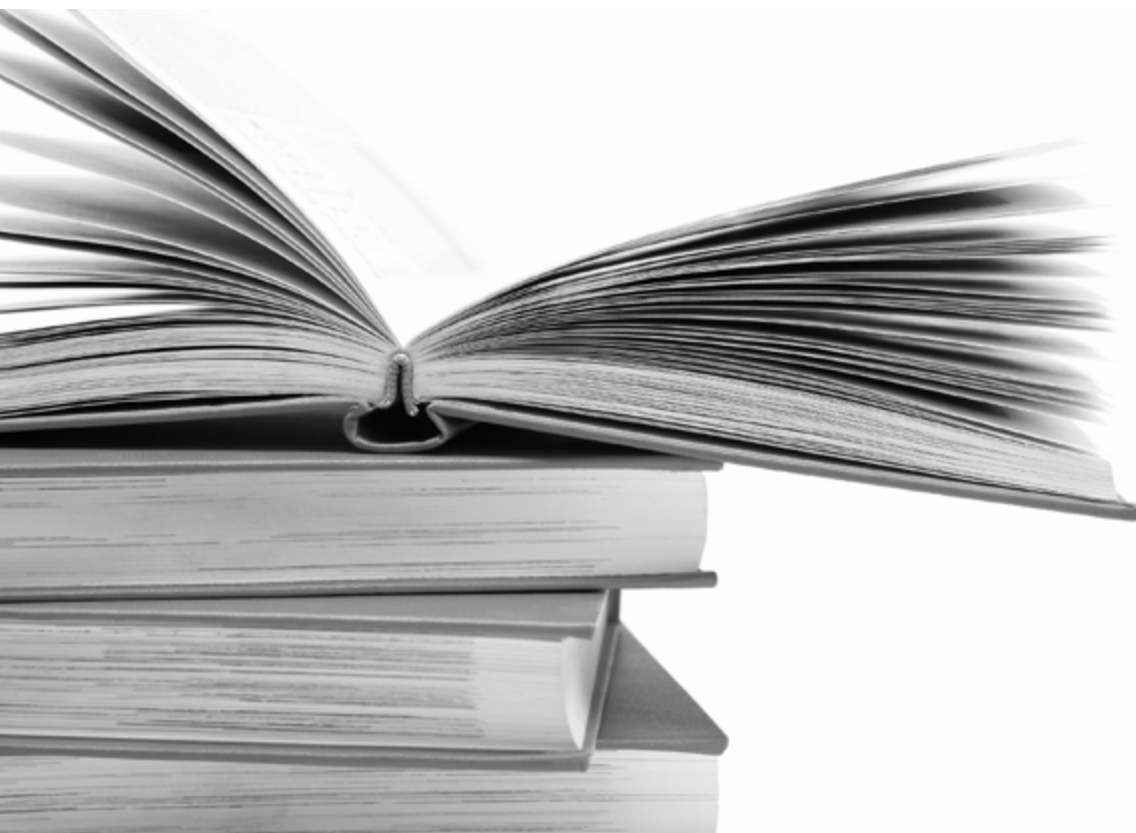
How does one introduce this topic to undergraduate students and other scientists just entering this field of study? *Regenerative Engineering*, edited by Laurencin and Khan, is up to the task. The chapters have been written by scientists, engineers and clinicians, many of whom are world-renowned leaders in this field. That these authors are educators as well qualified is apparent in the language, organization and presentation of their topic. Each chapter has been written as a stand-alone monograph

and can serve as an introduction to that specific topic in any undergraduate curriculum. Examples of regenerative engineering approaches for several organ systems are included, illustrating the translation of basic science research to clinical application.

This is a concise book (417 pages) with 15 chapters (again, perfect for undergraduate students). *Regenerative Engineering* begins with an overview, followed by chapters on biological principles (cell biology, stem cells and tissue regeneration), materials science and biomaterials and cellular and host responses. The Organ Regenerative Engineering chapter provides a pragmatic understanding of the challenges of successful engineering strategies. Six chapters are dedicated to clinical applications of regenerative engineering and provide practical insight. The final chapter, Engineering Limb Regeneration: Lessons from Animals that can Regenerate, is truly a look into the potential of this field in our understanding of limb regeneration.

A Solutions Manual is also available to educators. It contains a list of multiple choice and short answer questions (and answers) that have been provided by the authors of each of the chapters.

This book is a good book to have on your bookcase so that it can be easily handed to a student or young investigator. I foresee this book as a stepping off point to stimulate interest in a field that is rapidly evolving and is likely to have a significant impact on our ability to treat disease, disfigurement and trauma in the future.



SFB Member Books

A Summary of books published in 2013 that were written or edited by SFB members



This list is provided as a benefit to our membership to increase awareness of the scholarly efforts of our members within the biomaterials community. Only a limited number of books are reviewed each year within the Book Review column of the *Biomaterials Forum* of the Society due to time constraints of the volunteer editors; therefore, this more comprehensive list has been compiled to highlight their work. Designation of “Not Reviewed” does not imply any rating or evaluation of the book.

- Ashim M, Lee C, Cheng K. *Advanced Drug Delivery*. Hoboken, N.J.: John Wiley & Sons, Inc. ISBN: 978-1-118-02266-5. 550 pages. [Not Reviewed]
- Ratner B, Hoffman A, Schoen F, Lemons F, eds. *Biomaterials Science: An Introduction to Materials in Science, Third Edition*. Waltham, Mass.: Academic Press/Elsevier. ISBN: 978-0-12-374626-9. 176 pages. [Reviewed 1Q 2013]
- Bose S, Narayan R, Bandyopadhyay A, eds. *Biomaterials Science: Processing, Properties and Applications III: Ceramic Transactions, Volume 242*. Hoboken, N.J.: John Wiley & Sons, Inc. ISBN: 978-1-118-75103-9. 160 pages. [Not Reviewed]

- Ramalingam M, Wang X, Chen G, Ma P, Cui F, eds. *Biomimetics: Advancing Nanobiomaterials and Tissue Engineering*. Hoboken, N.J.: John Wiley & Sons, Inc. ISBN: 978-1-118-46962-0. 384 pages [Not Reviewed]
- Eliaz N, editor. *Degradation of Implant Materials*. New York/London: Springer/ Heidelberg Dordrecht. ISBN: 978-1-4614-3941-7 and ISBN 978-1-4614-3942-4 (eBook). 516 pages. [Reviewed 2Q 2013]
- Agrawal CM, Ong JL, Appleford M, eds. *Introduction to Biomaterials: Basic Theory with Engineering Applications*, Cambridge Texts in Biomedical Engineering. New York: Cambridge University Press. ISBN-10: 0521116902 and ISBN-13: 978-0521116909. 424 pages. [Not reviewed]
- Ramalingam M, Jabbari E, Ramakrishna S, Khademhosseini A, eds. *Micro and Nanotechnologies in Engineering Stem Cells and Tissues*. Hoboken, N.J.: John Wiley & Sons, Inc. ISBN: 978-1-118-14042-0. 328 pages [Not Reviewed]
- Laurencin CT, and Khan Y, eds. *Regenerative Engineering*. Boca Raton, Fla.: CRC Press. ISBN: 978-1-4398-1412-3. 417 pages. [Reviewed 3Q 2013]
- Fisher JP, Mikos AG, Bronzino JD, and Peterson DR. *Tissue Engineering: Principles and Practices*. Boca Raton, Fla.: CRC Press. ISBN: 978-1-4398-7400-4. 771 pages. [Not Reviewed]

Dear Special Interest Group (SIG) Members:

We would like to make you aware of a new opportunity for our SFB members.

In each issue of the SFB *Biomaterials Forum*, a review of a book that we believe is relevant to our membership is included. As the *Biomaterials Forum* is published only four times a year, this limits the number of books that we can review. Instead, would like to offer the following:

1. A listing of books (un-reviewed), in which members of the SFB had played a part (authors of books and/or chapters; editors). This list would be published in the *Biomaterials Forum* first and then published on the Society's website.
2. Members of the SFB may always suggest titles of books for us to review. However, as I mentioned, the list is growing and we try to review the books in a timely fashion (within a year of publication). However, we occasionally will review books that are considered classics or timeless in their content.
3. We would like to ask SIG members to volunteer to review books in their field. The perk is a free book. Please contact Lynne Jones, Book Review Editor for more information: ljones3@jhmi.edu.

Please note that it is our policy that no reviews will be accepted from authors or editors of the book under review.

Sincerely,

Lynne Jones, Book Review Editor
Liisa Kuhn, Editor in Chief
Steven Little, SIG Chair Representative

Non-metallic Biomaterials for Tooth Repair and Replacement

Pekka Vallittu
Woodhouse Publishing Series in Biomaterials; 2013
ISBN-10: 0857092448 and ISBN-13: 978-0857092441

This book focuses on the use of biomaterials for a range of applications in tooth repair and in particular for dental restoration. Given the paucity of books in this area, I'm pleased to bring this book to your attention. This text is an excellent resource for researchers with an interest in restorative dentistry.

Table of Contents

Part I: Structure, modification and repair of dental tissues

- Structure and properties of enamel and dentin
- Biomineralization and biomimicry of tooth enamel
- Enamel and dentin bonding for adhesive restorations
- Enamel matrix proteins (EMP) for periodontal regeneration

Part II: Dental ceramics and glasses for tooth repair and replacement

- Processing and bonding of dental ceramics
- Wear properties of dental ceramics
- Sol-gel derived bioactive glass ceramics for dental applications

Part III: Dental composites for tooth repair and replacement

- Composite adhesive restorative materials for dental applications
- Antibacterial composite restorative materials for dental applications
- Effects of particulate filler systems on the properties and performance of dental polymer composites
- Composite based oral implants
- Fibre-reinforced composites (FRCs) as dental materials
- Luting cements for dental applications

Implantable Sensor Systems for Medical Applications

Andreas Inmann and Diana Hodgins, eds.
Woodhouse Publishing Series in Biomaterials; 2013
ISBN-10: 1845699874 and ISBN-13: 978-1845699871
544 pages

The fundamentals of implantable systems including materials and material-tissue interfaces, as well as the biocompatibility, power sources, sterilization considerations and development of active implantable medical devices in a regulated environment, are discussed in this book. This book includes contributions from both academic and corporate experts, making it particularly valuable for corporate efforts in this area.

Table of Contents

Part I Fundamentals of implantable systems

- 1 Materials for implantable systems
- 2 Material-tissue interfaces in implantable systems
- 3 Packing and coating materials for implantable devices
- 4 Microassembly and micropackaging of implantable systems
- 5 Electrode array design and fabrication for implantable systems
- 6 Biofuel cells as sustainable power sources for implantable systems

Part II Challenges of implantable systems

- 7 Biocompatibility of implantable systems
- 8 Sterilisation considerations for implantable sensor systems
- 9 Protection of data confidentiality and patient privacy in medical sensor networks
- 10 Developing active medical devices in a regulated environment

Part III Applications of implantable systems

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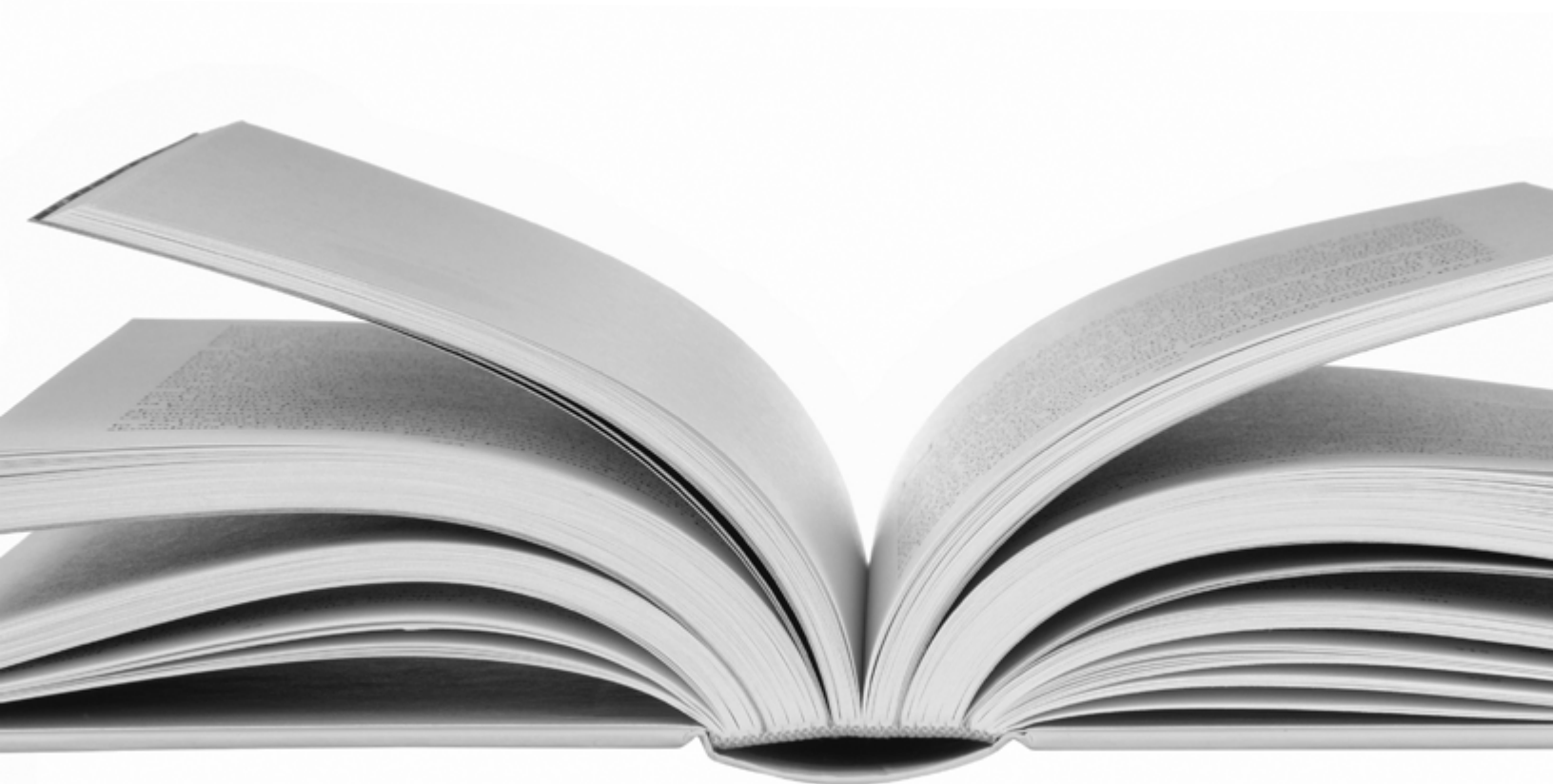
Characterization of Biomaterials

Michael Jaffe, Willis Hammond, Peter Tolias and Treena Arinzeh
Woodhouse Publishing; 2013
338 pages

This is book 64 in the Woodhouse Publishing Series in Biomaterials. It's a useful overview with a focus on assessing devices and materials efficiently as part of a pre-clinical testing program required before clinical use.

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