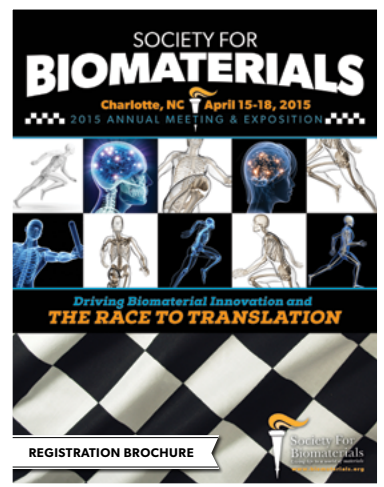


# BIOMATERIALS FORUM!

OFFICIAL NEWSLETTER OF THE SOCIETY FOR BIOMATERIALS

First Quarter 2015 • Volume 40, Issue 1

**INSIDE:**  
REGISTRATION BROCHURE  
AND OFFICER NOMINEES





# BIOMATERIALS FORUM



The official news magazine of the **SOCIETY FOR BIOMATERIALS** • Volume 40, Issue 1

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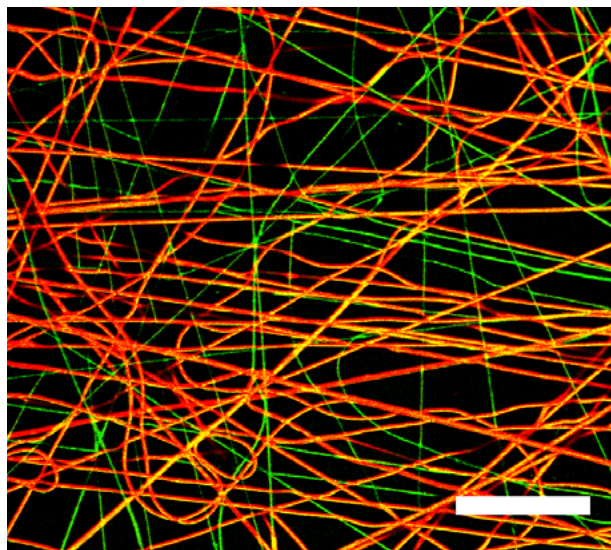
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**On the cover:** This image shows a fibrous hyaluronic acid scaffold formed with two distinct fiber subpopulations: crosslinked with a protease degradable peptide (green) and crosslinked with a non-degradable peptide (red). Fibers are covalently labeled with either fluorescein or rhodamine B to directly visualize fiber morphology. Scale bar: 25  $\mu\text{m}$ . Image provided by Ryan J. Wade, a PhD candidate in Prof. Jason A. Burdick's laboratory in the Department of Bioengineering at the University of Pennsylvania, ([seas.upenn.edu/~burdick2](http://seas.upenn.edu/~burdick2)).



Liisa Kuhn

### GREETINGS FELLOW BIOMATERIALS SCIENTISTS,

Hopefully you have started to make plans to attend the upcoming SFB Annual Meeting in Charlotte, North Carolina, April 2015. In anticipation of the meeting, this issue of the Forum

includes the meeting registration brochure and advance announcement of the 2015 Awardees. The Annual Meeting Program Committee has developed an interesting program emphasizing clinical translation of biomaterials research. Clinician Dr. Tony Atala, Director of the Wake Forest Institute for Regenerative Medicine and the W.H. Boyce Professor and Chair of the Department of Urology at Wake Forest University, will be a keynote speaker.

Here are some highlights from this issue of the Forum:

**Officer Nominees** — Find out who is running for SFB officer openings and read about their vision and plans for the Society so you can cast an informed vote.

**Historical Flashback** — This is my favorite article of the issue. Read about why Buddy D. Ratner has remained a long-term SFB member and see pictures of Dr. Ratner and colleagues from many years ago. Worth a peek!

**Industry News** — Find out about the latest mergers, acquisitions and expensive mistakes made by a couple of companies.

**Education News** — For the professors out there, the Biomaterials Education SIG has contributed an article about active learning that has some specific ideas about how to improve your next lecture. This article directly answers the question posed in the Education News column: Who is teaching teachers to teach? It's a real problem worthy of discussion.

**Opinion** — SFB member Howard Winet questions what makes a good meeting abstract in the Opinion column.

**Student News** — Biomaterials Days, organized by students for students, continues to spur excitement about the field of biomaterials and SFB. Read about the successful Georgia Tech Biomaterials Day that was held last fall, which empowered a student chapter to co-organize

next year's Biomaterial Days with Clemson. National Student Chapter President Jordan Gilmore writes about the exceptional networking opportunities for students at the Annual Meeting in his article in the Student News column. At the next Annual Meeting there will be a career fair with a student mentoring luncheon and mock interview sessions that students won't want to miss. Tip: students should feel free to contact SIG officers at other times besides the Annual Meeting as a way to continue the networking and mentoring opportunities from the Annual Meeting.

**Book Review** — Lynne Jones has identified and reviewed a book that anyone investigating biomaterial tissue interactions in mice should have: *Comparative Anatomy and Histology* (Academic Press). It guides the reader through normal mouse anatomy and histology using direct comparisons to the human. The side-by-side comparison of mouse and human tissues highlight the unique biology of the mouse, which has great impact on the validation of mouse models of human disease and may help you interpret your studies.

Please help us make sure this publication continues to reflect news of interest to you by sharing some biomaterials-related news or contributing a short review or opinion piece by emailing me at [Lkuhn@uchc.edu](mailto:Lkuhn@uchc.edu).

Hope to see you soon at the Annual Meeting!

Best wishes,

**LIISA KUHN, PhD**

*Biomaterials Forum* Executive Editor  
Associate Professor  
University of Connecticut Health Center





Nicholas Ziats

In this letter for *Biomaterials Forum*, I want to update the Society members of the ongoing events that occurred since I took office. The Board and council met in Cleveland, Ohio, in October 2014 and discussed many issues concerning the Society, taking action on a number of items. We discussed issues for the long-range plan and goals of the Society. Importantly, the financial status of our Society is still very strong. We continue to have sound financial investments and our membership remains strong. However, we continue to have discussions on ways to increase the membership, as well as how to offer value to our members.

The Membership Committee, chaired by Kurt Kasper, has developed programs this past year to address our membership concerns. They have focused on students, as they will provide the “life and blood” of our organization. Incentives to increase student chapter involvement will be implemented this year, as well as financial support for individual membership. An interesting discussion on recruiting members has been brought forth in a number of our committees and in the board and council. It was suggested that we do not have to significantly spend enormous time and money trying to recruit new members, but perhaps the strength is in the members that we already have. Thus, the question that has been brought forth is, “As a Society, are we to be judged by our membership numbers or by having the right members?” This issue will continue to be discussed.

**Students provide the “life and blood” of our organization. Incentives to increase student chapter involvement will be implemented this year.**

There are also two other issues that will need to be addressed this year, one concerning our contract with Wiley, Inc. and the second about our contract with Association Headquarters. Both contract issues will need to be addressed

by December 2015 and we are moving forward with discussion on both of these matters. I have appointed a task force, chaired by Alan Litsky, to review our Wiley contract and discussions on the AH contract have occurred at the board and council level.

In Cleveland, final plans were discussed for the upcoming meeting in Charlotte, North Carolina, April 15-18, and we hope you will make plans to attend. The co-chairs of the program, Helen Lu and Peter Edelman, have been hard at work and have an impressive program in place for the 2015 meeting. Having attended the December Program Meeting in Charlotte, North Carolina, I was impressed at the venue, as well as the effort of the Program Committee to put together another exciting meeting. At this meeting

**The question that has been brought forth is, “As a Society, are we judged by our membership numbers or by having the right members?”**

we will have workshops, symposia and general and plenary sessions focusing around themes, such as biocompatibility and immune engineering, biofabrication, multifunctional design and translation, which Peter and Helen put forth in their initial plan months ago. In addition, there will be a business challenge session and an education challenge for our students.

With regard to future meetings, the Meetings Committee has taken results from prior meeting surveys and narrowed down the 2017 and 2018 meeting sites to 10 cities. We have listened to your feedback about where you want to go and what you want in a meeting venue and we have sent out request for proposals (RFP) to all cities.

Finally, I was given the opportunity to visit Japan and give a plenary lecture on behalf of Kazuhiko Ishihara and the Japanese Society For Biomaterials. In discussions, there was hope that we could have a joint meeting of our two societies in Hawaii in the fall of 2020. The Liaison Committee,

chaired by David Puleo, has also heard proposals from a number of organizations interested in co-sponsoring meetings with us in 2016 (our off year) and these proposals are in current discussions.

The Awards, Ceremonies and Nominations Committee, chaired by Jim Anderson, has reviewed and selected an outstanding group of awardees for the upcoming meeting, as well as selection of an outstanding slate of candidates for offices in the Society. I thank Jim and his committee for the thoughtful consideration of all of the candidates and appreciate the considerable effort in deliberations this past year. In this issue of *Biomaterials Forum*, you will find the biographical sketches and vision statements of the candidates for the offices of the president, secretary/treasurer and member-at-large. In the past 5 years, we have had a dismal turnout for voting, with approximately 20 percent of our members voting each year. We need to hear your voice in the Society and one way is to vote, so please read the biographical sketches and vision statements (also available online) and vote.

Our Education and Professional Development Committee, chaired by Tim Topoleski, has approved seven Biomaterials Days applications this year, an increase of one from the previous year. One of my goals for this year was to increase the number of institutions receiving aid and even though this is only an increase of one organization, it increases interest in our Society and provides opportunities to become engaged in our organization for more students, faculty and industry members. I believe that Biomaterials Days are an important component of the Society and hope that we can expand this program in the coming years. However, at some point, we will also need to address the impact of the Biomaterials Days.

As this is my last letter as President of the Society, I thank you for your support this past year. There are a number of individuals who have made this an enjoyable experience, including the board, David Kohn, Lisa Friis, Horst von Recum, Steven Little, Thomas Webster, Tony Mikos and Joel Bumgardner, as well as the council members. A special thanks goes to our Past Presidents, Tony and Joel, for their advice, guidance and support over the past 2 years. I also thank the numerous individuals at Association Headquarters for their help, particularly Dan Lemyre, with whom I have had almost weekly interactions with. Their efforts and cooperation have been essential to the operations and success of our Society. In closing, I thank you for the honor of being elected to this office and in serving our Society this past year. I encourage you to offer any ideas, suggestions or comments regarding the past, present and future of SFB. Contact me at [npz@case.edu](mailto:npz@case.edu). See you in Charlotte!



**NICHOLAS P. ZIATS, PhD**

Case Western Reserve University  
President, Society For Biomaterials

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**I believe Biomaterials Days are an *important* part of the Society and hope that we can *expand this program* in coming years.**



BY DEB DUPNIK, ASSISTANT EXECUTIVE DIRECTOR



Hello from Society For Biomaterials (SFB) headquarters! As we gear up for SFB's 2015 Annual Meeting in Charlotte, North Carolina, the Board of Directors, governing council, committees, task forces and SIGs are working on the initiatives established at the fall board and council meeting.

### **AWARDS, CEREMONIES AND NOMINATIONS**

CHAIR JAMES M. ANDERSON, MD, PhD

The 2014 award recipients have been notified and a press release announcing their selection has been issued. The full article can be found starting on page 8 in this issue. In addition, the slate of officer candidates begins on page 10. The 2015-16 election website opened in January; please remember to vote before April 13, 2015.

### **BYLAWS**

CHAIR ANNE SALAMONE, PhD

The Bylaws Committee presented its recommendations to the council after suggestions were reviewed concerning changes in the Society's governance structure, including the length of the president's term, the possible addition of a second member-at-large and changes to the composition of the Finance Committee. The following committee recommendations were approved by the council:

1. Keep the term of president at 1 year.
2. Do not add a second Member-at-Large.
3. Change the bylaws to allow for a larger Finance Committee.

### **DEVICES & MATERIALS**

CHAIR SHROJAL DESAI, PhD

The Chinese SFB will host its 2015 national meeting in Haikou, Nov. 19-23, 2015. They would like to host the third U.S.-Chinese workshop at this time and include U.S. members on the committee. Professor Xingdong Zhang has agreed to serve as the chair for this committee. There will be a separate call for papers for this workshop early in 2015.

### **EDUCATION & PROFESSIONAL DEVELOPMENT**

CHAIR TIM TOPOLESKI, PhD

The committee is in development on several new initiatives, including programs in mentorship, K-12 outreach and a young scientist forum. The committee is reviewing seven applications it received for Biomaterials Days grants for 2015.

### **FINANCE**

CHAIR LISA FRIIS, PhD

The Finance Committee made several recommendations to the board regarding reductions to the proposed 2015 budget. Expenses are in line with projections and the Society is in good financial health.

### **LIAISON**

CHAIR DAVE PULEO, PhD

The Liaison Committee continues its efforts to coordinate and collaborate with other societies. This is especially important in the World Congress years, since SFB does not hold an annual meeting in those years. So far, the committee has received six preliminary proposals for 2016 joint symposiums. The committee is following up with the organizers of the proposals to obtain additional information and will continue to monitor progress and report to the council.

### **LONG RANGE PLANNING**

CHAIR TOM WEBSTER, PhD

The committee is investigating methods to increase participation from industry members, extend the Society's reach into the clinical community and provide additional member services in career development and resource sharing. The committee is also planning a strategic planning session in the summer of 2015.

### **MEETINGS**

CHAIR NICHOLAS ZIATS, PhD

The 2015 meeting will take place in Charlotte, North Carolina, April 15-18, 2015. The committee decided on the NASCAR Hall of Fame for the bash. A Request for Proposals (RFP) was sent out to 10 cities for the 2017 and 2018 annual meetings. The committee will review the information and make a recommendation to council for the venue for those meetings.

### **MEMBERSHIP**

CHAIR F. KURTIS KASPER

The committee proposed a new program to increase participation from the Society's 29 student chapters. Student chapter members will be offered a \$10 discount off the 2015 student membership rate. Chapters must submit a membership list to SFB headquarters to get the discount code.

### **PROGRAM**

CHAIRS PETER EDELMAN, PhD, AND HELEN LU, PhD

The 2015 Program Committee met in Charlotte, North Carolina, Dec. 2-3, 2014 to plan the sessions for the 2015

annual meeting. The preliminary program is online and a call for late breaking abstracts has been issued with a deadline of Feb. 2, 2015. Please visit the meeting website at [2015.biomaterials.org](http://2015.biomaterials.org) for the most up-to-date information about the 2015 meeting.

## PUBLICATIONS

### CHAIR ALAN LITSKY, MD, SCD

The Publications Committee reported that the Society's publisher of the *Journal of Biomedical Materials Research*, Wiley Blackwell, has plans to discontinue publishing the hard copy of the journal and move to a digital format. The *Biomaterials Forum* recently added a new column — The Historical Flashback — that has been well received. The Biomaterials Forum editors are looking for individuals interested in doing book reviews and also need cover art. Please contact Liisa Kuhn at [lkuhn@uchc.edu](mailto:lkuhn@uchc.edu) for additional information or to volunteer.

## NATIONAL STUDENT CHAPTERS

### PRESIDENT JORDON GILMORE

There are plans to survey students to determine what drives them to attend SFB meetings and particular sessions. A format for providing feedback to students about their talks during the annual meeting is being considered. A student lunch is planned for the 2015 annual meeting in Charlotte, North Carolina.

## SPECIAL INTEREST GROUPS

### REPRESENTATIVE STEVE LITTLE, PhD

For the second year, each SFB member will receive a complimentary SIG membership when they renew for 2015. Student members may join as many as they like for free. The deadline for SIG officer nominations was Jan. 15, 2015. Ballots were sent out the first week of February. The call for SIG representative nominations was Jan. 30–Feb. 13, 2015. This position is only open to SIG chairs and individuals who have served as a SIG chair in the past 3 years. The SIG Representative serves as the primary liaison between the SIGs, the Board of Directors and the SFB Council.

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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# The 10th World Biomaterials Congress (WBC 2016)

## MAY 17-22, 2016 | MONTREAL, CANADA | [WBC2016.ORG](http://WBC2016.ORG)

Attend WBC 2016 and share your knowledge on the latest emerging discoveries that will impact our Society. Join over 3,000 professionals from all sectors of the biomaterial industry around the globe.

The WBC 2016 themes include:

- Innovation in Fabrication
- Tissue Engineering & Regenerative Medicine
- Biomaterials for Therapeutic and Diagnostic Delivery
- Functional Biomaterials
- Mechanics and Modeling in Biomaterials Science and Engineering
- Biomaterials and Host Response
- Specific Applications of Biomaterials
- Building Blocks
- Biomaterials in Cellular Engineering
- Surfaces and Interfaces

By generating new paths for biomaterials science and engineering, New Frontier Symposia are anticipated to be a regular feature of future national and international biomaterials meetings. Each New Frontier Symposium will highlight a breakthrough topic that is innovative and complementary to the broad scientific themes of the WBC2016. New Frontier Symposium are intended to cultivate paradigms, exploit innovative methodological approaches, highlight fundamental questions that are being addressed or create bridges between biomaterials and other scientific fields.

**Submit your proposal for a New Frontier Symposia by March 1, 2015. Abstract submission will open on May 15, 2015.**



The Society For Biomaterials (SFB) proudly announces its 2015 award recipients. These Society professionals are recognized for their outstanding achievements and contributions to the biomaterials field. Each award recipient will be honored during the opening ceremonies for the 2015 Annual Meeting and Exposition, April 15-18 in Charlotte, North Carolina.



## FOUNDERS AWARD

PAUL DUCHEYNE, PhD, UNIVERSITY OF PENNSYLVANIA

The Founders Award is based upon long-term landmark contributions to the discipline of biomaterials.

Dr. Ducheyne is a world-renowned

trailblazer in the biomaterials field as a researcher and entrepreneur. He has shown leadership and dedication to the Society, having served in numerous positions, including past president. As Professor of Bioengineering and Orthopaedic Surgery Research at the University of Pennsylvania and Director of its Center for Bioactive Materials and Tissue Engineering, he has made major contributions to the biomaterials field. He has authored about 330 papers and chapters in a variety of international journals and books and has edited 16 books and book volumes. He has also been granted more than 40 U.S. patents with international counterparts. His papers have been cited about 9,700 times with an “h-factor” of 56; his 10 most visible papers have been cited about 2,600 times. Dr. Ducheyne is editor-in-chief of *Comprehensive Biomaterials*, a six-volume, 3,650-page major reference work published by Elsevier in August 2011.



## C. WILLIAM HALL AWARD

CARL R. MCMILLIN, PhD, SYNTHETIC BODY PARTS, INC.

The C. William Hall Award honors members who have made a significant contribution to the Society and have an outstanding record in establishing,

developing, maintaining and promoting the objectives and goals of the Society. Dr. McMillin has been a steadfast supporter and practitioner of biomaterials science for over 30 years and has been helping patients from positions in academia and industry. He has also served as a consultant. As a founding member of the Biomedical Engineering

Department at the University of Akron, Dr. McMillin directed the cardiovascular facilities. He was a scientist and research director at AcroMed, where he developed orthopedic implants, including, notably, spinal disc implants. Dr. McMillin was a supporter of the Biomaterials Access Assurance Act. His service to the biomaterials community continues in many ways: He is an active member of the IRB at University Hospitals Case Medical Center in Cleveland, an officer of the Biomaterials and Medical Products Commercialization Special Interest Group and a co-organizer of several important sessions at annual meetings, including the well-received SFB Business Plan Competition in Denver, for which he was also a judge and peer reviewer.



## SOCIETY FOR BIOMATERIALS AWARD FOR SERVICE

LYNNE C. JONES, PhD, JOHN HOPKINS UNIVERSITY

The Biomaterials Award for Service is presented to an individual, corporate or government entity who has

provided significant service to the Society by establishing, developing, maintaining and promoting its objectives and goals. Dr. Jones has provided extraordinary service to the Society, not only in her active duty roles, but also as an advisor to many presidents, members and students. She has served on the council in various capacities since 2000 and on the board since 2002. Dr. Jones has been the representative to the International Union of Societies Biomaterials Science and Engineering, elected to serve from 2012-2016. Dr. Jones has been an active reviewer of manuscripts for a number of biomaterials journals, including serving on the editorial board of the *Journal of Biomedical Materials Research (JBMR)*. She was the special interest group (SIG) chair representative to the council from 2000-2002 and again in 2007-2008. She has maintained an active role in the Biomaterials Tissue Interactive SIG and the Orthopedics and Education SIGs. She has served on the Awards, Ceremonies and Nominations Committee twice, as well as serving as its chair in 2012-2013. She has served on various committees of the Society since 1999, including the Program, Meetings, Long-Range Planning, Bylaws, Membership, Education And Professional Development And Finance Committees. She has also served as the program chair and Secretary/Treasurer, as well as President. She is currently a member of the President's Advisory Committee.



**TECHNOLOGY, INNOVATION & DEVELOPMENT AWARD**

FREDERICK J. SCHOEN, MD, PhD, BRIGHAM AND WOMEN'S HOSPITAL

The Technology, Innovation & Development Award recognizes

an individual (or team) who provided key scientific and technical innovation and leadership in a novel product in which biomaterials played an important and enabling role. During his more-than-40-year career Dr. Schoen has contributed to the evolution of mechanical and biological heart valve substitutes through the science and engineering of biomaterials, coupled with sound pathological principles and practice. Dr. Schoen is currently Professor of Pathology and Health Sciences and Technology at Harvard Medical School, and Director of Cardiac Pathology and Executive Vice-Chairman in the Department of Pathology at the Brigham and Women's Hospital (BWH). He is director of the BWH Biomedical Research Institute (BRI) Technology Innovation Program and BWH liaison (Site Miner) for the Center for Integration of Medicine and Innovative Technology (CIMIT).



**CLEMSON AWARD FOR BASIC RESEARCH**

JENNIFER WEST, PhD, DUKE UNIVERSITY

To be considered for this award nominees must have contributed to the basic knowledge and

understanding of the interaction of materials with biological molecules, cells and/or tissues. Dr. West's passion as an innovator has been consistent over her career. From her work on photopolymerized hydrogels with cell adhesive and proteolytically degradable domains to the design of nanoparticles linked with protease sensitive peptides, clinical impact is a major focus. Her designer Nitric-Oxide-releasing hydrogels has shown great potential in graft endothelialization. Her pioneering work in nanotechnology offers both diagnostic imaging and therapeutic treatment for localized active tumor cells in normal tissue, leading to truly significant advances in cancer management. This therapy is currently in three clinical trials for prostate, lung and recurrent head and neck tumors.



**CLEMSON AWARD FOR APPLIED RESEARCH**

XINGDONG ZHANG, PhD, SICHUAN UNIVERSITY

Nominees for the award must show significant utilization or application of basic science to accomplish a

significant goal in the biomaterials field. Dr. Zhang has directed truly pioneering research and provided exceptional international leadership in the biomaterials and regenerative medicine fields, especially in the application of tissue-inducing biomaterials focused on bone and cartilage tissue engineering. He has made important and lasting contributions to the literature regarding the processing, characterization and application of bioactive calcium phosphate ceramics for tissue regeneration.



**CLEMSON AWARD FOR CONTRIBUTIONS TO LITERATURE**

LONNIE D. SHEA, PhD, NORTHWESTERN UNIVERSITY

Nominees for this award must have made significant contributions to the

literature on the science or technology of biomaterials. Dr. Shea has published over 168 papers in peer reviewed journals and 11 book chapters in the biomaterials and tissue engineering fields. Professor Shea's awards and honors include the Natural Science Foundation (NSF) New Century Scholar, NSF Career Award and election as a Fellow to the American Institute for Medical and Biological Engineering (AIMBE) in 2010. Several of the publications represent major advancements to the development of porous polymer scaffolds for gene delivery and tissue engineering.





**SFB YOUNG INVESTIGATOR AWARD**

CRAIG L. DUVALL, PhD,  
VANDERBILT UNIVERSITY

Dr. Duvall's major contributions have been in the elegant design of new polymer delivery systems that leverage advances in controlled living polymerization techniques, such as atom transfer radical polymerization (ATRP) and reversible addition fragmentation chain transfer (RAFT) polymerization. He designs new polymers at the molecular level, synthesizes them, uses them for the delivery of a range of biological drugs and takes them all the way into in vivo studies.



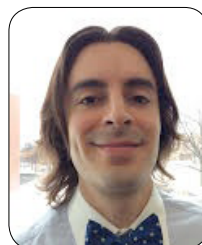
**STUDENT AWARD FOR OUTSTANDING RESEARCH, UNDERGRADUATE**

AMANDA CHEN, UNIVERSITY OF CAMBRIDGE

Ms. Chen recently finished her bachelor's degree in biomedical engineering at The University of Rochester. She is the recipient of one of the rare and prestigious Goldwater Fellowships and was inducted into Tau Beta Pi and Phi Beta Kappa as a junior. She received the Most Outstanding Junior in Biomedical Engineering award in 2013 and the Most Outstanding Senior award this past year. She worked on the development of biologically active scaffolds for regulating stem cell differentiation for chondrogenesis. Her contributions have led to a paper submission to the *Journal of Biomaterials Research* on which she will be the first author.

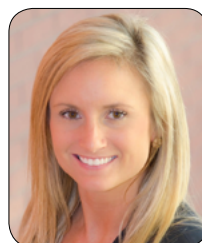
**STUDENT AWARDS FOR OUTSTANDING RESEARCH, PhD**

The Student Awards for Outstanding Research are being awarded to two individuals who have demonstrated outstanding achievement in biomaterials research.



MICHAEL J. MITCHELL, PhD,  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Dr. Mitchell was recently awarded a PhD in biomedical engineering from Cornell University in July, and transitioned to Massachusetts Institute of Technology (MIT) in August as a Postdoctoral Fellow in the laboratory of Dr. Robert S. Langer. His recent work is focused on the development of charged biomaterial surfaces for the differential adhesion, isolation and separation of CTCs and blood cells from patient blood samples.



LINDSEY SANDERS, CLEMSON UNIVERSITY

Ms. Sanders joined the Clemson bioengineering graduate program in 2011 following a career in patent law as a United States Patent and Trademark Office (USPTO) registered Patent Practitioner with experience in new product development and implementation in the medical device and pharmaceutical industries. As a PhD candidate in bioengineering, she focuses effort on applied biomaterials science, specifically on the development of adhesive hydrogels for soft tissue.

# Officer Nominees

## PRESIDENT-ELECT

The President-Elect shall become familiar with the duties of the President and shall, at all times, cooperate and assist with the duties of that office. In the absence of the President, the President-Elect shall preside at the meetings of the Society, the council and the Board of Directors, and perform the duties and exercise the powers of President. The term of office is for a period of 1 year without succession. The President-Elect is the chairperson of the Long Range Planning Committee.

## NOMINEES FOR PRESIDENT-ELECT



DAVID H. KOHN, PhD  
Professor  
University of Michigan  
Biomedical Engineering and  
Departments of Biologic and Materials  
Sciences

**Biographical Sketch** Dr. David H. Kohn is a Professor at the University of Michigan with appointments in biomedical engineering and the departments of biologic and materials sciences. He received a bachelor's degree in biomedical engineering from Tulane University (1983) and master's degree (1985) and doctorate (1989) in bioengineering from the University of Pennsylvania. He joined the faculty at the University of Michigan in 1989 and has progressed through the academic ranks. He previously served as the graduate chair in biomedical engineering and is currently director of a National Institute of Health (NIH) training program in tissue engineering. In 2000-2001, Dr. Kohn was a visiting professor in the Craniofacial and Skeletal Diseases Branch of the NIH intramural laboratories. Dr. Kohn also serves on the advisory boards of several universities and has consulted for many medical device companies.

Dr. Kohn's research has progressed from the investigations of synthetic biomaterials at the macroscopic and microstructural levels to the synthesis and characterization of biomaterials at smaller levels of dimensional scale. In parallel, he has also established a vigorous research program in tissue mechanics. His early work with load-bearing biomaterials led to strategies for processing implants with increased function and non-destructive techniques to monitor function of biomaterials and tissues. Several of these technologies were translated into the private sector. Dr. Kohn's research has evolved as the field of biomaterials has evolved.

Currently, his research program focuses on more biologically based biomaterials and biomechanics research that is well-integrated with cell and molecular biology approaches. Dr. Kohn's research focus is now related to biomineralization, which is investigated by establishing structure-function relations in naturally forming

mineralized structures and utilizing this information to develop biomimetic strategies to engineer mineralized tissue. His work has provided insight into mechanisms of bone fragility and mechanically mediated tissue adaptation by coupling mechanical and chemical analyses. His lab has also developed organic/inorganic hybrid materials that can communicate the biological microenvironment leading to better control of stem cell function in vitro and tissue formation in vivo.

Dr. Kohn has been continually funded throughout his career, including support from NIH, National Science Foundation (NSF), Department of Defense (DoD) and the industry. He has published over 120 peer-reviewed papers and book chapters, holds five patents and has over 100 invited presentations. Dr. Kohn has taught biomaterials and tissue engineering courses to undergraduate and graduate engineering students, as well as clinical students and residents. He has trained 37 graduate students, seven post-docs, 40 undergraduates, 14 residents and five visiting scholars.

Dr. Kohn is a long-standing member of many professional organizations, including the Society For Biomaterials (SFB). He has performed an extensive amount of service to the community, including organization of symposia and workshops at SFB, Tissue Engineering International & Regenerative Medicine Society (TERMIS), American Society of Mechanical Engineers (ASME), International Association for Dental Research (IADR), Biomedical Engineering Society (BMES) and American Association for the Advancement of Science (AAAS); service on NIH, NSF, DoD, the Arthritis Foundation and the National Sciences and Engineering Research Council (NSERC) study sections; and review of manuscripts for over 45 biomedical journals. He is the recipient of a Whitaker Foundation Biomedical Research Award, NSF Research Initiation Award, NIH IPA award (visiting professor at NIH), and a Distinguished Scientist Award from IADR. Dr. Kohn is a Fellow of the International Union of Biomaterials Scientists and Engineers (IUSBSE), American Institute for Medical and Biological Engineering (AIMBE) and AAAS.

Dr. Kohn has been an active member of the Society for 25 years, dating back to when he was a graduate student. He has been an abstract reviewer and session chair almost annually

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LIISA TIINA KUHN, PhD  
 Tenured Associate Professor  
 Reconstructive Sciences Department  
 University of Connecticut Health  
 Center (UCONN Health)  
 Core faculty, Biomedical Engineering  
 Department  
 University of Connecticut-Storrs

**Biographical Sketch** Dr. Liisa Tiina Kuhn is a tenured associate professor in the reconstructive sciences department at the University of Connecticut Health Center (UCONN Health) and core faculty in the biomedical engineering department at the University of Connecticut-Storrs. She received her undergraduate degree in mechanical engineering at Duke University and a master's degree and doctorate in materials engineering at the University of California Santa Barbara. Dr. Kuhn held postdoctoral positions at Case Western University and Harvard Medical School/Boston Children's Hospital, conducting biomineralization studies and orthopaedic research. She joined the faculty at UCONN Health after co-founding and selling a start-up company in Boston, Massachusetts, that developed bone graft substitutes. Her cutting-edge research in orthopaedic biomaterials and drug delivery systems has been supported by federal (NIH), state (Connecticut) and private funding sources (e.g., Komen Foundation and Coulter Foundation). She is currently funded by the NIH National Institute of Dental and Craniofacial Research (NIDCR) for her work in growth factor releasing biomaterials for bone regeneration in the elderly. Her publications span several scientific areas, including bone regeneration, physical and chemical characterization of bone mineral, mechanics of materials, immunological adjuvants, anti-cancer drug delivery, nanoparticles, cell culture plate coatings for stem cell expansion and guided differentiation of pluripotent stem cells.

She trains the next generation of scientists by advising undergraduate, graduate and postdoctoral trainees and has been a course director of several UCONN biomaterials courses. The Connecticut Technology Council recognized her entrepreneurial efforts with the Women of Innovation award in 2009. For Dr. Kuhn's exceptional contributions to medical product standards writing, the American Society of Testing and Materials (ASTM) awarded her the top three awards of the Society over the years, including most recently the honorary title, Fellow. She serves on the editorial boards of several biomaterials, tissue engineering and stem cell journals and reviews manuscripts for many different scientific journals. She is a regular reviewer for NIH and has served as a reviewer for private, state-based and European agencies.

An active member of SFB since 1997, Dr. Kuhn has a long record of service. She has been very active in the programmatic activity for SFB. She served as the Annual Meeting program chair (2002), treasurer and chair of the Orthopaedic SIG (1999, 2001) and vice-chair and chair of the Drug Delivery SIG (2005, 2006, 2007). She also organized several symposia (2005-2006, 2010 and 2012-2013) and a workshop on regulatory pathways (2009).

Dr. Kuhn has reviewed abstracts nearly every year and has moderated many sessions. She was the SFB book reviewer for the *Biomaterials Forum* for 9 years (2002-2011). She has experience with the governance of the Society through her service as a member of the Educational and Professional Development Committee (2003), the Membership Committee (2005), the Awards Committee (2007 and 2009) and as the executive editor of the *Biomaterials Forum* (since 2011), which requires SFB Council participation.

**Vision Statement** "If I have the privilege to be elected as the next SFB President, I intend to increase the status and visibility of the SFB within our professional community. To achieve this, I propose a multi-pronged approach that includes Society participation in standards of writing within ASTM, leading to direct impact on new product regulation and healthcare; publication of special issues of the Society's two journals focused on reviews about cell and tissue-biomaterial interactions, which is the Society's forte and reinforces its unique identity within the tissue engineering arena; development of two different Internet courses aimed at clinicians or industry professionals to increase revenue, impact and membership; international networking events at the Annual Meeting to promote international visibility and partnerships; and continued support of Biomaterials Days and student chapters because our students are our future. The initiatives will include:

*Strengthen SFB's Position as a Global Authority on Biomaterials*

I plan to use the insights gained from my long-term service to ASTM to liaise and mobilize the expertise within SFB to help develop medical product standards. Generating critical medical product standards accelerates and positively impacts healthcare because these standards are used by the Food and Drug Administration to facilitate regulatory decisions. SFB and ASTM are not competing organizations, therefore membership is not jeopardized. ASTM task force meetings could be included at times as part of SFB Annual Meeting programming. Progress and the publication of new standards would be reported on the SFB website and in the *Biomaterials Forum*, thereby attracting attention to the activity.

Continued on page 13



David H. Kohn, PhD continued

since then and has organized many symposia. He has served on the Program Committee on multiple occasions (1997-2002, 2007 and 2014) and is the former chair of the Oral/Craniofacial Biomaterials Special Interest Group (SIG) (1996-1999). He served on the Awards, Ceremonies and Nominations Committee in 2003-2004 and the Education and Professional Development Committee in 2005-2006 and 2009-2010, when he was chair. Dr. Kohn was Member-at-Large in 2006-2007 and served on the Long Range Planning Committee. As Member-at-Large, he brought concerns of members to the board and council and was able to create a forum for having members' concerns better addressed. As the Education Professional Development Chair, he worked with the committee to expand the quantity and quality of Biomaterials Days, implemented student chapter awards and helped launch a mentorship program. Dr. Kohn is currently Secretary-Treasurer. In this capacity, he has helped guide the Society during times of financial concern, declining membership and competition from other societies, managing its resources, helping the Society grow its assets and enabling these assets to be used to add value to membership.

**Vision Statement** "My first SFB meeting was the World Congress in Washington, D.C. in 1984 when I was a graduate student. I remember the excitement of being able to connect faces with names of people whose papers I had read and eventually meeting them. In the 30 years since that meeting, I have made life-long colleagues and friends through SFB. I am honored to have now been nominated for president and to have the opportunity to help guide the Society and give back to an organization that has meant so much to me professionally and personally.

The field of biomaterials has undergone significant growth in the last 20 years, yet SFB has witnessed declining membership and we are not all that we could or should be. My long-standing participation in the Society reflects my commitment to help shape the future of the Society and field of biomaterials, to help us grow as the field grows and to improve the quality of our product. We are the most comprehensive society in the field and our comprehensive excellence is unmatched. We are not just an academic society, as many other societies are — we embrace our industrial, clinical and government members. We are

not just a tissue engineering society — we embrace our rich tradition of research, discovery and troubleshooting of implants and medical devices. We are not just a basic materials or biological research society — we specifically focus on the intersection of materials and biology and have long focused on bench-to-bedside and bench-to-industry translation. Being this comprehensive, we need to balance breadth and depth, and create synergies across our breadth. If elected, I will strive to ensure that our members from all sectors see the value of membership, meetings and publications, and that this value is provided in a cost-effective manner.

I will use my experience and understanding of the Society's structure and operations to work with you to increase the benefits of your membership, so it is unambiguous why someone would join SFB or renew their membership. I believe in investing in people and processes. With regard to the former, I will engage you and listen to your ideas on what we do well and what we can do better. Regarding the latter, I believe that we need to critically evaluate our governance and management as we set new strategic directions. I believe that the board and council, in concert with all of you, need not only continue to be operationally successful, but to place greater emphasis on setting a bold vision and direction for the Society and field. If the Society can better serve its members and provide the structure and excitement for its members to want to belong, we will be able to provide a forum for your recognition in the field of biomaterials.

To achieve the goal of making it universally acknowledged that SFB is the premier professional society for people involved in all areas of biomaterials research, development, education, service and translation, I will work to ensure that we are the primary home to biomaterialists in academia, industry and government, whether they be established in the field, other fields new to biomaterials, just starting their career or still in training. In this regard, I would like to strengthen our mentorship programs at all levels, outreach and interactions between basic researchers, clinicians and industry through the form of challenge grants. If we think in a bold manner, the quantity and quality of our endeavors will improve, as will our visibility and metrics of increased membership and meeting attendance. I look forward to the opportunity to continue to serve the Society."

Liisa Tiina Kuhn, PhD continued

*Increase SFB's Visibility, Impact and Stature Through Outreach and Publications*

I've been an SFB member for 17 years because of the camaraderie I experience and the technical insights I gain at every Annual Meeting. To increase our members' opportunities for networking with foreign organizations and the Society's global visibility, I would like to initiate a "meet and greet" at the Annual Meeting, focused specifically on foreign attendees. SFB council members, and any other members interested in attending, would have a short scheduled time set aside to meet with foreign attendees. With regards to competition with the Society, I believe biomaterials are not represented as well at competing organization's conferences (e.g., TERMIS and BMES) because they cover much broader scientific areas. Biomaterials are a crucial component of the burgeoning field of regenerative medicine, whether as cell culture substrates, scaffolds or delivery vehicles. Biomaterials is in the name of our Society and we should exploit that as a tactic to reinforce our identity. I would work with our Society's journal editors to organize special editions of the *Journal of Biomedical Materials Research (JBMR-A)* and *Applied Biomaterials* that will feature impactful reviews about control and guidance of cell-biomaterial and tissue-biomaterial interactions. These publications would attract recognition within the biological research community that may attend competitor meetings and increase visibility, attracting new members to the SFB.

*Increase Clinician and Industry Membership and SFB Revenue Through Internet-Based Courses Geared Toward Clinicians and Industry Professionals*

I have come to appreciate that no innovation within our field is possible without the direct involvement of clinicians, as well as manufacturers. I believe that more

medical and dental clinicians and industrial members could be attracted to join SFB as members if the Society were to offer Internet-based workshops or continuing education classes about biomaterials products in an unbiased manner. This is timely given the pressure on clinicians to avoid conflicts of interest in their choice of medical products (e.g., the Sunshine Act). I would work with the Materials and Devices Committee of SFB to identify the top areas of interest for the courses geared towards industry to ensure participation.

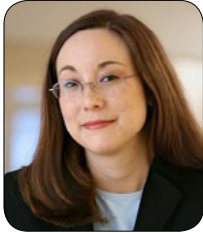
Importantly, these activities are in accordance with the strategic plan prepared by our recent past presidents and the Long Range Planning Committee and, thus, the current forward momentum of the Society will not be lost during the leadership transition. I will work diligently to achieve these broad goals because SFB is my home society and I am very devoted to the organization.

I would be honored to serve as your next SFB President. I am grateful for the nomination. Particularly because I have been a long-term, active member of SFB and have held positions in industry and academia, I believe that I have the experience, vision and demonstrated commitment to lead SFB in an informed and broad-reaching way. I will support the SFB's mission and vision to be the preeminent 'multidisciplinary society dedicated to promoting advancements in all aspects of biomaterials science, education and professional standards to enhance human health and quality of life.'"

## SECRETARY-TREASURER-ELECT

The Secretary-Treasurer-Elect shall become familiar with the duties of the Secretary-Treasurer, cooperate and assist in carrying out the duties and prepare for eventual succession to that office. In the temporary absence of the Secretary-Treasurer, the Secretary-Treasurer-Elect will perform the duties and exercise the duties of the office. The term of office shall be for a period of 2 years without succession. The Secretary-Treasurer-Elect shall be the chairperson of the Finance Committee.

### NOMINEES FOR SECRETARY-TREASURER-ELECT



SHELLY SAKIYAMA-ELBERT, PhD  
Professor  
Washington University, St. Louis  
Biomedical Engineering and Surgery

**Biographical Sketch** Shelly Sakiyama-Elbert, PhD, is a professor of biomedical engineering and surgery at Washington University in St. Louis. She earned bachelor's degrees in chemical engineering and biology from the Massachusetts Institute of Technology. She earned master's and doctorate degrees in chemical engineering from the California Institute of Technology, working on biomaterials nerve injury. She joined the faculty at Washington University in 2000. She is currently the associate chair for graduate studies in biomedical engineering, as well as co-director of the recently established Center of Regenerative Medicine. Her research focuses on developing biomaterials for drug delivery and cell transplantation for the treatment of peripheral nerve and spinal cord injury.

She has written five book chapters and over 70 articles in peer-reviewed journals. She has eight U.S. patents and two additional patent applications are currently submitted. Her research is funded by the National Institute of Neurological Disorders and Stroke (NINDS)/NIH. She received early career awards from the Whitaker Foundation and the WH Coulter Foundation. She is a member of the Hope Center for Neurological Disorders and Institute of Materials Science and Engineering (IMSE) at Washington University. Her honors include Corcoran Fellow California Institute of Technology (1996-97), 30 under 30 St. Louis Business Journal (2001), the Dean's Award for excellence in advising and mentoring (2008), Recognition for excellence in graduate mentoring — Graduate Student Senate and Dean of the Graduate School of Arts & Sciences (2011) and WU Distinguished Faculty Award (2013). She served on TERMIS, the Americas Council (2008-2014) and the

Biomedical Engineering Society (BMES) Board of Directors (2009-2012). She joined the College of Fellows for AIMBE in 2011 and was elected a fellow of the (BMES) in 2013. Her other professional services include serving as an associate editor for *Biotechnology and Bioengineering*, a member of the editorial board of *Acta Biomaterialia* and a standing member of the Biomaterials/Biointerfaces (BMBI) study section for the NIH (2010-2013). She served as chair for the 2013 Gordon Research Conference on biomaterials and tissue engineering.

Dr. Sakiyama-Elbert has been active in SFB for many years, through service as a Cell and Organ Therapies and Tissue Engineering SIG officer, a member of the Strategic Long Range Planning Committee (2003-2006) and a member of the Membership Committee (2004-2007). She has also served as a session organizer and reviewer for numerous sessions at the Annual Meeting.

**Vision Statement** "It is an honor to have been nominated for the position of SFB Secretary-Treasurer-Elect. I have a long record of service to the SFB through the SIGs and on committees in the Society, as well as continued support of the Annual Meeting programing. I consider SFB to be my home scientific society. The biomaterials community has provided wonderful scientific discourse and mentorship for me. It is important to continually evaluate how membership benefits all members of the biomaterials community (industry, academia and government agencies) and how we can work together to advance the science and translation of materials in medicine. It is also critical that we continue to plan for the long-range financial stability of the Society to allow us to weather economic and federal funding challenges.

As Secretary-Treasurer-Elect I will learn from the current Secretary-Treasurer in preparation of assuming the full position. As Secretary-Treasurer, I will communicate financial concerns and opportunities to the board/council and strive to ensure that communication with the membership is transparent on financial matters. Providing cost-effective value to our membership is key to retaining/converting current student members, as well as ensuring that our current members continue to view the Society as their home for scientific discourse and policy discussions."





JOHNNA TEMENOFF, PhD  
Associate Professor  
Coulter Department of Biomedical  
Engineering  
Georgia Tech/Emory University  
Bioengineering and Bioscience Faculty  
Fellow  
Georgia Tech Parker H. Petit Institute

**Biographical Sketch** Dr. Johnna Temenoff has been an active member of SFB since she attended her first SFB annual conference as a graduate student in 2001. In particular, she has served as a member of the Finance Committee (2007-2012), the Meetings Committee (2012-2013) and the Education Committee (2013-2014), as well as chairing sessions in annual meetings since starting as an assistant professor in 2005. Dr. Temenoff is currently an associate professor in the Coulter Department of Biomedical Engineering at Georgia Tech/Emory University, as well as a bioengineering and bioscience faculty fellow of the Georgia Tech Petit Institute.

Over the course of her career to date, Dr. Temenoff has published over 40 peer-reviewed papers, 10 book chapters and has produced 90 scientific abstracts for national and international conferences. Dr. Temenoff has received funding from a wide range of sources, including federal agencies (NIH and NSF) and groups such as the Aircast Foundation and National Football League (NFL) Charities. She currently serves as the principle investigator on a NIH T32 Predoctoral Training grant in rational design of biomaterials. She has been honored with several prestigious awards, such as the NSF Career Award and the Arthritis Foundation Investigator Award. She was recently named the co-director for the Regenerative Engineering and Medicine Center (REM), a statewide initiative encompassing three premier research universities in Georgia.

Dr. Temenoff has also co-authored a highly successful introductory textbook with Dr. Mikos — *Biomaterials: The Intersection of Biology and Materials Science*. This book has already been adopted in over 50 universities, including several top-tier biomedical engineering departments in the U.S. In addition, it has also been printed in three international editions. In response, Dr. Temenoff and Dr. Mikos were awarded the American Society for Engineering Education's 2010 Meriam/Wiley Distinguished

Author Award for best new engineering textbook. Dr. Temenoff has also served on the editorial board for *Journal of Materials Chemistry B*, *Journal of Orthopedic Research*, *Nature Scientific Reports* and *Tissue Engineering*. She was also a member of the advisory council, as well as the musculoskeletal technical interest group chair for TERMIS–Americas.

**Vision Statement** “It is an honor to be nominated for SFB’s Secretary-Treasurer-Elect position. SFB has played a critical role in my professional development, dating back to my first SFB conference as a graduate student. I have received numerous benefits from being a member of this society, not only scientifically, but also through networking and mentoring. I therefore believe that SFB is crucial to support biomaterials innovation, as well as preparing a workforce to create and use these important next-generation technologies.

As a member of the SFB Finance Committee (2007-2012), I saw first-hand how much care previous secretary-treasurers have taken to promote the financial well-being of the society. During this time, I also became extremely aware of the importance of the role of Secretary-Treasurer to SFB as a whole. My main goal, if elected, is to build upon this strong tradition and to ensure that SFB continues to be able to provide added value to its members. I will work with the council to assure priority areas are funded and provide suggestions on enabling means to better serve the membership. I believe that my previous membership on the Finance Committee will allow an easy transition to my role as Secretary-Treasurer-Elect and will help assist in best managing our operating and reserve budgets to achieve our fiscal goals.

In this information-rich age, I understand that attracting membership and attendance at annual meetings is a challenge for all professional societies and I look forward to working with the council and the meeting chairs to assure that we are using our budgets in a most effective manner to continue to make SFB an institution that will attract interest of a variety of constituents from academic, industrial and governmental sectors. This interaction of a wide range of biomaterial scientists is what first attracted me to SFB and I intend to ensure the Society’s financial health so we can continue to provide a forum for such exchanges well into the future.”

## MEMBER-AT-LARGE

The Member-at-Large shall serve as an unencumbered representative of the membership at meetings of both the Board of Directors and the Council. The Member-at-Large shall serve for a period of 1 year.

### NOMINEES FOR MEMBER-AT-LARGE



ELIZABETH COSGRIFF-HERNANDEZ, PhD  
Associate Professor  
Texas A&M University  
Biomedical Engineering and Material  
Science and Engineering

**Biographical Sketch** Elizabeth Cosgriff-Hernandez, PhD is an associate professor of biomedical engineering and material science and engineering at Texas A&M University. She received a bachelor's degree in biomedical engineering and a doctorate in macromolecular science and engineering from Case Western Reserve University under the guidance of Professors Anne Hiltner and Jim Anderson. She then completed a UT-TORCH postdoctoral fellowship with Professor Tony Mikos at Rice University. Dr. Cosgriff-Hernandez joined the faculty of the bio-medical engineering department at Texas A&M in 2007. Her laboratory specializes in the development of hybrid material systems that combine the advantages of synthetic and natural polymers to advance tissue-engineering design. Biomaterial synthesis is complemented by the development of new fabrication strategies with improved control over 3D scaffold architecture.

In addition to publishing numerous articles on polymeric biomaterials, she is an associate editor of the *Journal of Biomedical Materials Research, Part B Applied Biomaterials* and is on the editorial board of the *Journal of Biomaterials Science, Polymer Edition*. Dr. Cosgriff-Hernandez has been an active member of SFB since 2001 and served on numerous committees over the past 10 years. She has been involved with the Tissue Engineering SIG for many years, including serving as the program chair (2011-2013) and vice-chair (2013-2015). Other Society committees she served on include the Program Committee (2014-2015), Long Range Planning Committee (2013-2015), Education and Professional Development Committee (2010-2014) and the Awards, Ceremonies and Nominations Committee (2014-2015). Dr. Cosgriff-Hernandez was instrumental in starting the SFB Women's Networking Luncheon and has been very active in programming at the annual meetings including the popular Biomimetic Materials for Tissue Engineering sessions (2009-2012, 2015). She has also chaired and served on the steering committee of the Texas Biomaterials Day over the past 5 years and is the faculty advisor of the Texas A&M SFB Student Chapter.

**Vision Statement** "It is an honor to be nominated for the position of Member-at-Large. SFB is the first scientific meeting that I attended as a student and it has been an incredible support community throughout my career. The Society serves many roles for its membership; it is a venue for scientific discourse, a training ground for students, a place to network and a common ground for academia, industry and the clinic to interact. I have always valued the training and opportunities that I have received here and, if elected, I would take this opportunity to give back by representing the membership on the council and for the Society. The Society rises and falls by the participation of its members. The role of the Member-at-Large is to serve as a spokesman for the members and ensure that the SFB leadership hears your needs and concerns. In this capacity, my main priorities will be to:

#### *Listen to You*

I want to hear from you whether you are a student at your first meeting or an industry leader. Each type of member is going to have different perspectives and suggestions for the direction of the Society. The diversity of our membership is one of our strengths and I want to ensure that the leadership hears these different perspectives.

#### *Increase Member Participation*

Member involvement in program and event planning is integral to building a strong society. Numerous programs are available for participation from the undergrad to senior scientist level. I want to help you find a role or expand your role in the Society. Increased participation will ensure that we maintain a strong organization that is dynamic in addressing its members' needs.

#### *Assess Membership Value*

It is well known that recruitment and retention of members in any group is strongly linked to the perceived value of that membership. Members will return and contribute to a society that they feel adds value to their career. I want to hear from you about what you value in the organization or if your value of your membership is declining. This type of feedback is critical in maintaining a stable organization and growing our membership.

If elected as the Member-at-Large, I would be honored to serve as your voice to the SFB leadership and I promise to enthusiastically work to improve our Society for its members."



**BENJAMIN G. KESELOWSKY, PhD**  
 Associate Professor  
 University of Florida  
 J. Crayton Pruitt Family  
 Department of Biomedical Engineering

**Biographical Sketch** Dr. Benjamin G. Keselowsky received a bachelor's degree in chemical engineering from the University of South Florida and a doctorate in bioengineering from the Georgia Institute of Technology. He joined the faculty of the University of Florida in 2005, where he now is an associate professor. He is currently funded by the NIH. In the past he has been funded by NSF, the Arthritis Foundation and the Juvenile Diabetes Research Foundation. He serves on editorial boards for the Journal of Biomedical Materials Research-Part A and the Journal of Materials Chemistry B, and is an active reviewer for NIH and NSF.

His group seeks to understand immune cell interactions with biomaterials and the engineering of controlled-release biomaterials capable of directing immunological processes. This work has wide-ranging implications in diverse fields, such as implanted devices, therapeutic vaccines and tissue engineering. Of particular interest is the biomaterials-based modulation of the phagocytic antigen present cell types of dendritic cells and macrophages. A large focus is engineering polymeric biomaterials-based microparticles as an injectable vaccine system to retrain the immune system, correcting aberrant activation toward pancreatic self-antigens for type 1 diabetes. Microparticles with encapsulated immune modulatory factors and antigen provide targeted, controlled delivery to both intracellular and cell surface receptors of dendritic cells *in vivo* to promote tolerance. While systemic administration of immune-modulating agents can often result in harmful off-target effects due to uncontrolled dosing of bystander tissues, encapsulation into biodegradable microparticles can provide dose sparing and targeting.

His academic home has been SFB since his first meeting in 1999. His growing involvement has been a source for professional development, intellectual growth and personal connections that has anchored him to SFB. He is grateful for the many opportunities he has had to be involved with the SFB team. His involvement in the Society has included service on the Meetings Committee, Site Selection Committee, Membership Committee, Program Committee and the Long Range Planning Committee. He has also served as an officer of the Proteins and Cells at Interfaces SIG and worked with colleagues to organize and chair numerous sessions and symposia. He is currently an officer of the Immune Engineering SIG.

**Vision Statement** "I look forward to deepening my involvement in the Society as Member-at-Large. I admire the past and current leadership and I'm excited to play a larger role in shaping the future of our Society. As Member-at-Large, I will have the opportunity to represent the broader membership of the Society by serving both on the Board of Directors and the council of the Society. My role will be to provide a clear voice for the membership on the direction of the Society; encourage and solicit ideas to make our Society better; and advocate for changes that the membership sees as adding value. Engaging the SIGS as a gateway to member involvement and soliciting feedback with membership polls are critical tools.

Professional and academic societies in general have recently been experiencing challenges recognizing and responding to increasingly diverse member needs and wants. Societies have been competing for members with overlapping interests by expanding services offered without increasing dues. To maintain our membership level, we need to identify high-value initiatives that maximize resources at hand. One area of need is to more successfully retain student members. Recent efforts to engage student chapters include providing seed funds for local student chapters as a low cost. This is an impactful way to engage students and I would encourage expanding this effort. Over the next year, I will have access to the SFB National Student Chapter, as the President-Elect is a PhD student in my group, and I will actively solicit the student perspective. We also need to maintain or grow industry involvement by ensuring program content is relevant to our industry members. We have had some recent success in engaging industry members into leadership roles and this effort could be expanded.

As a cross-cutting initiative, I believe updating the efforts in Society communication would go a long way in adding value to our members. The SFB website and the Biomaterials Forum magazine both feature high-quality content — an excellent array of interesting biomaterials news, member spotlights and Society updates designed to inform and provide value to members. However, the content is under-utilized. Most people rarely visit individual websites; instead they rely on news collectors or social media outlets. This isn't an issue about needing to communicate more content — it is about communicating it more effectively. Disseminating our news items through social media venues could provide huge increases in the regular exposure to Society content, providing visibility to our discipline, engagement with our society and increasing value to our members. Biomaterials is an expansive, exciting field that has the potential to draw in wide public interest. Boosting visibility to biomaterials science and the Society could pay large dividends for all of us."



# SOCIETY FOR **BIOMATERIALS**

**Charlotte, NC**  **April 15-18, 2015**

 2015 ANNUAL MEETING & EXPOSITION 



*Driving Biomaterial Innovation and*  
**THE RACE TO TRANSLATION**

**REGISTRATION BROCHURE**



Society For  
Biomaterials  
*Giving life to a world of materials*  
[www.biomaterials.org](http://www.biomaterials.org)

## ABOUT THE SOCIETY

The Society For Biomaterials is a professional society that promotes advances in biomedical materials research and development by encouragement of cooperative educational programs, clinical applications, and professional standards in the biomaterials field. Biomaterials scientists and engineers study cells, their components, complex tissues and organs, and their interactions with natural and synthetic materials and implanted prosthetic devices, as well as develop and characterize the materials used to measure, restore and improve physiologic function, and enhance survival and quality of life.

## PROGRAM OVERVIEW

### **Driving Biomaterial Innovation and THE RACE TO TRANSLATION**

The theme for the Society For Biomaterials 2015 Annual Meeting & Exposition is **"Driving Biomaterial Innovation and the Race to Translation"** a nod to the NASCAR-driving rebels who will host this year's Annual Meeting. In keeping with that theme, the Program Committee is developing a program which focuses on clinical translation of biomaterial research. Major themes will include: Biocompatibility and Immune Engineering, Biofabrication, Multifunctional Design and Translation. The Annual Meeting strives towards fostering the discussion and collaboration needed for the development of new implant materials and devices, which, in turn, will lead to the improvement of the human condition itself. 2015's meeting format will include symposia, general sessions, workshops and panel discussions, covering all aspects of basic, applied and translational biomaterials science.

## SFB 2015 PROGRAM COMMITTEE CHAIRS

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## SFB STAFF

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## 2015 KEYNOTE SPEAKER

### **DR. ANTHONY ATALA**

Anthony Atala, MD, is the Director of the Wake Forest Institute for Regenerative Medicine, and the W.H. Boyce Professor and Chair of the Department of Urology at Wake Forest University. Dr. Atala is a practicing surgeon and a researcher in the area of regenerative medicine. His current work focuses on growing new human cells, tissues and organs.

Dr. Atala works with several journals and serves in various roles, including Editor-in-Chief of Stem Cells- Translational Medicine, Current Stem Cell Research and Therapy, and Therapeutic Advances in Urology; Associate Editor of Tissue Engineering and Regenerative Medicine, The Journal of Rejuvenation Research, and Gene Therapy and Regulation; Executive Board Member or Section Editor of the International Journal of Artificial Organs, Organogenesis and Current Urology Reports; and Editorial Board member of Expert Opinion on Biological Therapy, Biomedical Materials, Journal of Tissue Science and Engineering, 3D Printing and Additive Manufacturing, Technology, the Journal of Urology, Recent Patents on Regenerative Medicine, BioMed Central-Urology, Urology and Current Transplantation Reports.

Dr. Atala is a recipient of many awards, including the U.S. Congress-funded Christopher Columbus Foundation Award, bestowed on a living American who is currently working on a discovery that will significantly affect society; the World Technology Award in Health and Medicine, presented to individuals achieving significant and lasting progress; the Samuel D. Gross Prize, awarded every 5 years to a national leading surgical researcher by the Philadelphia Academy of Surgery; the Barringer Medal from the American Association of Genitourinary Surgeons for distinguished accomplishments; the Gold Cystoscope award from the American Urological Association for advances in the field; the Ramon Gutieras Award for pioneering research in regenerative medicine and outstanding contributions as a scholar and teacher; the Innovation Award from the Society of Manufacturing Engineers for the creation of synthetic organs; and the Rocovich Gold Medal, awarded to a distinguished scientist who has made a major impact on science toward the understanding of human disease. In 2011, he was elected to the Institute of Medicine of the National Academy of Sciences. Dr. Atala was elected to the Royal Academy for the Encouragement of the Arts in 2012 and to the National Academy of Inventors as a Charter Fellow in 2013. Dr. Atala's team received the Edison Science/Medical Award in 2013.

Dr. Atala's work has been described in the lay press. In 2003, he was named by Scientific American as a Medical Treatments Leader of the Year for his contributions to the fields of cell, tissue and organ regeneration. Dr. Atala's work was listed as Time Magazine's top 10 medical breakthroughs of the year and as Discover Magazine's Number 1 Top Science Story of the Year in the field of medicine in 2007. In 2009, Dr. Atala was featured in U.S. News & World Report as one of 14 Pioneers of Medical Progress in the 21st Century, and his work in 2010 was listed by Smithsonian Magazine as one of 40 things to know about the next 40 years. Dr. Atala's work was listed in the Huffington Post as one of 18 great ideas of 2011, in Time Magazine as one of the top 5 medical breakthroughs of the year in 2011, by the American Association of Retired Persons as one of the 50 influential people who will make life better in 2012 and by Time Magazine as one of 5 discoveries that will change the future of organ transplants in 2013.

Dr. Atala has led or served several national professional and government committees, including the National Institutes of Health working group on Cells and Developmental Biology, the National Institutes of Health Bioengineering Consortium and the National Cancer Institute's Advisory Board. Dr. Atala heads a team of over 300 physicians and researchers. Over 10 applications of technologies developed in Dr. Atala's laboratory have been used clinically. He is the editor of 12 books, including Essentials of Stem Cell Biology, Principles of Regenerative Medicine, Foundations of Regenerative Medicine, Methods of Tissue Engineering and Minimally Invasive Urology. He has published more than 400 journal articles and has applied for or received over 200 national and international patents.



## HIGHLIGHTS OF THE 2015 MEETING WILL INCLUDE:

### Symposia

A symposium is designed to focus our attention on a specific topic within the large disciplines that make up the Society's membership. The symposium highlights a well-defined topic that is not addressed by the regular sessions of the Annual Meeting. The format includes a single, lead speaker followed by related abstracts. The lead speaker either presents the current concepts of the topic or presents cutting-edge research within the area.

- Advanced Hydrogels With Hierarchical Structures for Biological Applications
- Advances in Ophthalmic Biomaterials
- Benchtop Models to Support Medical Device and Pharmaceutical Invention and Commercialization
- Biofabrication and Biomanufacturing in Tissue Engineering and Regenerative Medicine (TERM)
- Biologically Derived Materials from Natural Sources
- Biomaterials for Cardiovascular Regeneration
- Biomaterials for Regenerative Engineering
- Bio-Nanomaterials for Cancer Theranostic Treatment
- Ceramics and Composites in Bone Tissue Engineering and Drug Delivery
- Characterization of Microenvironment of Immune Cells in Wound Healing
- Delivery of Nucleic Acids and Other Molecules that Modulate Gene Expression
- Harnessing Biomaterials to Engineer the Adaptive Response for Immunity or Tolerance
- Multiscale Biomaterial Design
- Nanobiomaterial and Drug Delivery Strategies for Dental/ Craniomaxillofacial Repair/Regeneration
- Next Generation Biomaterial and Drug Delivery Technologies for Wound Healing
- Stem Cell and Biomaterial Interactions
- Technology Development/New Biomaterials for Immune Engineering
- Vascular and Blood Cells Responses to Novel Cardiovascular Biomaterials

### General Sessions

A general session explores a topic that is familiar to the general membership. Abstracts reflect the most current research in that field.

- Academic-Industry Collaborations in Biomaterials Research
- Advanced Antimicrobial Materials
- Advances in Programmable Biomaterials for Drug Delivery and Regenerative Medicine
- Bio-Inspired Cellular Microenvironments
- Biomimetic Materials for Tissue Engineering
- Cardiovascular Biomaterials
- Dental/Craniofacial
- Drug Delivery
- Drug Delivery for Immunomodulation
- Engineering Cells and Their Microenvironments
- Engineering Tissue Interfaces
- Immunomodulation in Regenerative Medicine
- Injectable Biomaterials for Tissue Regeneration
- Innate Immunity and Inflammation in Biomaterials Contexts
- Local Delivery of Drugs and Growth Factors from Implant Coatings
- Macromolecular Drug Delivery
- Materials and Matrices for Osteochondral Tissue Engineering
- Mechanical Characterization of Biomaterials
- Modulating the Neural Microenvironment
- Molecular Mechanisms Governing Protein-Surface and Cell-Surface Interactions
- Multifunctional Nanomaterials for Engineering Complex Tissues
- Nanomaterials
- Orthopaedic Biomaterials
- Recent Advances in Surface Modification of Biomaterials
- Small Molecule Drug Delivery
- Targeted and Target-Activated Drug Delivery
- Tissue Engineering
- Vaccine Delivery Vehicles





## Workshops

Workshops will provide an in-depth educational experience on topics relating to biomaterials with a significant amount of time dedicated to discussion, questions and answers.

**Each workshop requires separate registration, the fees for which are detailed on the registration form.**

- Cell-Based Bio-Manufacturing
- Drug-Eluting Stents and Beyond
- Testing Methods for Performance Prediction of Materials and Devices
- Biomaterial Degradation Analysis
- Recent Advances in 3D Printing of Biomaterials
- Surface Modification and Characterization of Biomaterials: Concepts, Principles and Latest Developments

### CELL-BASED BIO-MANUFACTURING

Much research has focused on the implantation of cells and cell-derived proteins with or without scaffolds for tissue regeneration. Scaling up such approaches to manufacturing presents issues that are not often considered in experimental planning at the level of academic labs. This workshop will allow two leaders in commercial applications of regenerative medicine to discuss their experiences and to explain some of the constraints to expect when considering moving lab-scale approaches to large-scale manufacturing.

### DRUG-ELUTING STENTS AND BEYOND

Following angioplasty, drug-eluting devices, including stents, balloons and infusion catheters, have been shown to be effective at inhibiting restenosis resultant from vascular smooth muscle cell proliferation and neointima formation relative to non-drug-eluting devices. Drug-eluting stents, in particular, have yielded exceptional clinical outcomes in comparison to bare metal stents. Through an improved understanding of the mechanism by which drugs are released and intracellularly delivered, the approach used to develop second generation drug-eluting devices can be improved. This workshop will evaluate drug-eluting stents formed from biodegradable scaffolds and other methods of controlling the release of drugs after angioplasty. Comparisons will be made in regards to efficacy, safety and mechanism of action. Speakers will primarily consist of industrial experts who can attest to the effectiveness and practicality of such devices and address regulatory concerns.

### TESTING METHODS FOR PERFORMANCE PREDICTION OF MATERIALS AND DEVICES

The testing methods used to evaluate, develop, produce, commercialize and assess the clinical performance of medical devices and the materials used in devices are critical requirements. The correlation of testing methods for development and production to the clinical performance of medical devices has multiple past and current successful and unsuccessful outcome examples. With technology enhancements and medical device recipient changes, the need for more evolving and refined test

methods grow. This workshop will address test method success, failures and future needs in several different medical devices and related biomaterials in the orthopaedic and cardiovascular markets.

### BIOMATERIAL DEGRADATION ANALYSIS

Biomaterial degradation is a critical concern for any medical device, whether it is preventing degradation of implantable devices or predicting the rate of degradation of drug-releasing particles or tissue-engineering scaffolds. Researchers often use accelerated in vitro testing to predict long-term in vivo behavior, however, there are several pitfalls that can lead to incorrect conclusions about how a device will perform after implantation. This workshop will provide a background on in vivo degradation mechanisms, experimental design of accelerated degradation studies and discuss in vitro-in vivo correlations.

### RECENT ADVANCES IN 3D PRINTING OF BIOMATERIALS

Industrial and academic researchers have recently examined the use of 3D printing technologies to overcome the limitations associated with conventional manufacturing processes. These technologies involve fabrication of 3D structures through additive joining of materials in a layer-by-layer manner. This workshop will review recent developments in 3D printing technologies for processing biomaterials into artificial tissues as well as biosensors, drug delivery devices and medical instruments. Several topics related to 3D printing, including processing of radiographic images, development of computer models, novel 3D printing technologies and novel materials for use in 3D printing, will be discussed. This workshop will create collaboration and discussion among the many groups involved in the development and use of 3D printing technologies, including biomaterials engineers, medical device manufacturers and clinicians. We anticipate that this workshop will facilitate future research activities, including industry-university collaborations involving 3D printing of biomaterials for use in medicine, surgery and dentistry.

### SURFACE MODIFICATION AND CHARACTERIZATION OF BIOMATERIALS: CONCEPTS, PRINCIPLES AND LATEST DEVELOPMENTS

The surface of a biomaterial is the interface between the biomaterial and the biological environment it is placed in. Thus, it is essential to properly and precisely engineer the surface chemistry and structure of a biomaterial to optimize its performance in biological applications. Surface characterization of these engineered surfaces and interfaces is required to determine if the desired surface chemistry and structure was obtained. This workshop will provide an overview of the fundamentals of surface modification and characterization, along with latest developments and challenges in these fields. The capabilities and new directions of the Electron Spectroscopy for Chemical Analysis (ESCA) for the characterization of biomedical nanoparticles along with ToF-SIMS for 3D mass spectral imaging of biological materials will be emphasized. The latest strategies for engineering biomaterial surfaces and the corresponding surface characterization challenges of analyzing those modified surfaces will also be emphasized.

## Panel Discussions

Panel Discussions are presented in a format that fosters an open debate on a topic. The invited speakers include renowned experts in the area of focus and the chair allows time for open discussion with the audience.

- Cardiovascular Device Development and the Regulatory Process
- ICF Fellows Session: Is Translational Research More Impactful Than Basic Science Research (A Debate)
- Industrial Innovations in Biomaterials
- Polyurethanes: From Materials Development to Device Evaluation and Back Again
- Progress and Challenges in Basic Science and Translation of Orthopaedic Biomaterial-Associated Infections
- Trauma: The New Frontier in Biomaterials

### CARDIOVASCULAR DEVICE DEVELOPMENT AND THE REGULATORY PROCESS

Meeting of FDA and international standards and testing protocols constitutes an integral part of getting a medical device approved. In a global setting, region specific requirements mandated by the various regulatory bodies often tend to be confusing. This session is aimed at bringing together expertise from various cardiovascular fields like catheters, drug eluting stents, heart valves, vena cava filters, etc. to help gain a better understanding of the “real-world” development/regulatory process. It will include not only the regulatory process as a part of the discussion, but a bulk of the discussion would also involve non-clinical testing for these various devices necessary to satisfy the regulatory bodies.

### ICF FELLOWS SESSION: IS TRANSLATIONAL RESEARCH MORE IMPACTFUL THAN BASIC SCIENCE RESEARCH (A DEBATE)

There is currently a vibrant discussion on the impact of our collective research enterprise. The implication of this debate has a profound effect on funding priorities, policies, public opinions, academic missions, health care delivery and industry for years to come. The purpose of this debate is to provoke a thoughtful exchange of this important topic: “Is translational research more impactful than basic science research?” In this context, we will also explore how “research impact” is defined and whether the current drive towards translation harms the support of basic research. Can both co-exist and synergize? Several members of the International College of Fellows of Biomaterials Science and Engineering (ICF-BSE) will present different perspectives on this topic, helping the audience gain a deeper perspective of the impact of translational versus basic research. The audience will be actively involved in the debate and will be polled before and after the debate to examine how the discussion has changed their opinion.

### INDUSTRIAL INNOVATIONS IN BIOMATERIALS

This panel session will highlight four examples of successful commercialization of new biomaterials and their products, e.g.,

coronary stents, neuronal re-growth and blood filtering. Each speaker will discuss biomedical engineering factors, as well as business factors that were encountered during commercialization.

### POLYURETHANES: FROM MATERIALS DEVELOPMENT TO DEVICE EVALUATION AND BACK AGAIN

Polyurethanes have been used in medical devices for over 50 years due to their biocompatibility and exceptionally tunable mechanical properties. We propose a session that provides an overview of the full life cycle of polyurethanes in medical devices, from development and scale-up to medical device design, testing and FDA approval to clinical retrieval analysis. This session will engage numerous industry members and provide an excellent opportunity for student members to hear about the spectrum of materials design and testing in medical devices.

### PROGRESS AND CHALLENGES IN BASIC SCIENCE AND TRANSLATION OF ORTHOPAEDIC BIOMATERIAL-ASSOCIATED INFECTIONS

Orthopaedic surgeons and scientists have recognized biomaterial-associated infection as one of the most serious clinical complications. This panel will include infection experts from orthopaedic surgery, infectious disease, microbiology, immunology, bioengineering and materials science. The panel will examine and discuss the progress, challenging obstacles, future research topics and education and outreach related to biomaterial-associated infection, and will focus on clinically translatable developments and strategies. The aim of the panel discussion is to expand basic science and clinical knowledge and have a positive impact on patient care.

### TRAUMA: THE NEW FRONTIER IN BIOMATERIALS

There is increasing awareness of the need for optimized treatment of battlefield injuries for severely injured servicemen and women. Federally funded programs to address this need have included the Armed Forces Institute of Regenerative Medicine (AFIRM) and many Department of Defense-sponsored research projects. The results of this research may also be applied to traumatic injuries of civilians. There has been an exchange of knowledge between what has been learned on the battlefield and what has been learned in hospitals and research laboratories at home. It is important for the Society For Biomaterials (SFB) to foster this exchange by providing a forum to our membership which highlights the successes of this translation. With trauma-related injuries, a major factor is the complexity of the issues due to the involvement of multiple organ systems. Three physicians will address issues regarding trauma injuries relating to orthopaedics, cardiovascular surgery and other organs/tissues. The physicians have a unique perspective in that they have been actively involved in the translation of the knowledge directly gained from battlefield to the treatment of trauma patients in hospitals in the United States. The goal of this panel discussion is to encourage biomaterials scientists and engineers to enter the field of research for traumatic injuries.



## Competitions

### 2ND ANNUAL SFB BUSINESS PLAN COMPETITION

Medical technology requires more than just laboratory results to become a reality. Students and post docs will put their skills to the test in this unique session designed to challenge them to consider the commercialization aspects of their research. Individuals and groups will be judged by experts from investing, industry, regulatory and academia on the strength of their commercialization plans. Prizes will be awarded to the top team. Participants will give a 10-minute pitch followed by a "shark tank" style Q&A, from the judges and audience.

### STUDENT EDUCATION DESIGN COMPETITION

The Biomaterials Education Challenge will encourage SFB student chapters and other student clubs or groups to develop innovative and practical approaches to biomaterials education. Student teams will be challenged to develop an educational module for middle school (6th-8th grade) science classes. Each educational module will demonstrate fundamental biomaterials concepts with scientific principles that are understandable to a middle school audience and designed for a 45-minute class period. The education modules should have hands-on components, should be easily incorporated to typical middle school science courses and should have materials easily obtained with clear educational and learning objectives. Winners will be identified based on their potential for educational impact, and judges will emphasize innovation, practicality and likelihood of widespread adoption and dissemination of the educational projects. The goals of this competition are to improve widespread understanding of biomaterials-related science and careers in the middle school population; to encourage SFB student chapters to participate in K-8 outreach efforts; and to reward the communication skills and creativity of the next generation of biomaterials researchers and educators. *Entries are due March 1, 2015. Please see the website for additional details.*



Society For  
Biomaterials  
*Giving life to a world of materials*

## PRELIMINARY PROGRAM

*(Tentative and Subject to Change)*

### WEDNESDAY, APRIL 15, 2015

**7:30 am – 7:00 pm**

Registration Open

**8:00 am – 10:00 am**

**Workshops:**

- Cell-Based Bio-Manufacturing
- Drug-Eluting Stents and Beyond
- Testing Methods for Performance Prediction of Materials and Devices

**10:00 am – 12:00 pm**

**Workshops:**

- Biomaterial Degradation Analysis
- Recent Advances in 3D Printing of Biomaterials
- Surface Modification and Characterization of Biomaterials: Concepts, Principles and Latest Developments

**12:00 pm – 2:00 pm**

**Opening Ceremony**

**1:00 pm**

**Keynote Address:**

Anthony Atala, MD,  
Wake Forest Institute for  
Regenerative Medicine

**2:00 pm – 4:00 pm**

**Concurrent Session I**

- Biologically Derived Materials from Natural Sources
- Biofabrication and Biomanufacturing in Tissue Engineering and Regenerative Medicine (TERM)
- Advanced Hydrogels with Hierarchical Structures for Biological Applications
- Recent Advances in Surface Modification of Biomaterials
- Vaccine Delivery Vehicles
- Cardiovascular Biomaterials
- Biomaterials for Regenerative Engineering
- Panel Discussion: Industrial Innovations in Biomaterials

**4:15 pm – 6:15 pm**

**Concurrent Session II**

- Targeted and Target-Activated Drug Delivery
- Benchtop Models to Support Medical Device and Pharmaceutical Invention and Commercialization
- Nanobiomaterial and Drug Delivery Strategies for Dental/ Craniomaxillofacial Repair/ Regeneration
- Multiscale Biomaterial Design
- Characterization of Microenvironment of Immune Cells in Wound Healing
- Macromolecular Drug Delivery
- Drug Delivery for Immunomodulation
- Orthopaedic Biomaterials

**6:15 pm – 8:15 pm**

**Opening Reception**

*(In the Exhibit Hall)*

**THURSDAY, APRIL 16, 2015**

**7:00 am – 5:30 pm**

Registration Open

**7:00 am – 8:00 am**

**Special Interest Group Meetings**

*(at The Westin Charlotte)*

**8:00 am – 8:15 am**

**Coffee Break**

**8:15 am – 10:15 am**

**Plenary Session I: Clemson Awards**

**Clemson Award for Basic**

**Research:** *Jennifer West, PhD, Duke University*

**Clemson Award for Applied**

**Research:** *Xingdong Zhang, PhD, Sichuan University*

**Clemson Award for Contributions to the Literature:**

*Lonnie Shea, PhD, Northwestern University*

**10:15 am – 10:30 am**

**Break**

**10:30 am – 12:30 pm**

**Concurrent Session III**

- Orthopaedic Biomaterials 2
- Bio-Nanomaterials for Cancer Theranostic Treatment
- Biofabrication and Biomanufacturing in Tissue Engineering and Regenerative Medicine (TERM) 2
- Tissue Engineering
- Nanomaterials
- Engineering Cells & Their Microenvironments
- Local Delivery of Drugs and Growth Factors from Implant Coatings
- Panel Discussion: Trauma: The New Frontier in Biomaterials

**12:30 pm – 1:30 pm**

**Lunch on your own**

**(Student Lunch and SIG Meetings at The Westin Charlotte)**

**1:30 pm – 3:30 pm**

**Concurrent Session IV**

- Multifunctional Nanomaterials for Engineering Complex Tissues and Drug Delivery
- Stem Cell and Biomaterial Interactions
- Cardiovascular Biomaterials 2
- Delivery of Nucleic Acids and Other Molecules that Modulate Gene Expression
- Biomimetic Materials for Tissue Engineering
- Harnessing Biomaterials to Engineer the Adaptive Response for Immunity or Tolerance
- Ceramics and Composites in Bone Tissue Engineering and Drug Delivery
- Panel Discussion: ICF Fellows Session: Is Translational Research More Impactful Than Basic Science Research (A Debate)



3:30 pm – 4:00 pm

**Break in Exhibit Hall**

4:00 pm – 5:30 pm

**Concurrent Session V**

- Technology Development/  
New Biomaterials for Immune  
Engineering
- Academic-Industry Collaborations  
in Biomaterials Research
- Dental/Craniofacial
- Immunomodulation in  
Regenerative Medicine
- Ophthalmic Biomaterials
- Modulating the Neural  
Microenvironment
- Advances in Programmable  
Biomaterials for Drug Delivery and  
Regenerative Medicine
- Materials and Matrices for  
Osteochondral Tissue Engineering

5:30 pm – 7:00 pm

**Poster & Exhibit Reception**

**FRIDAY, APRIL 17, 2015**

7:00 am – 5:00 pm

Registration Open

7:00 am – 8:00 am

**Special Interest Group Meetings**  
*(at The Westin Charlotte)*

8:00 am – 8:15 am

**Coffee Break**

8:15 am – 10:15 am

**Plenary Session II: SFB Awards**

**Founders Award:** *Paul Ducheyne, PhD, University of Pennsylvania*

**Technology Innovation and Development Award:** *Frederick J. Schoen, MD, PhD, Brigham and Women's Hospital*

**Young Investigator Award:** *Craig Duvall, PhD, Vanderbilt University*

10:15 am – 10:30 am

**Break**

10:30 am – 12:30 pm

**Concurrent Session VI**

- Mechanical Characterization of  
Biomaterials
- Injectable Biomaterials for Tissue  
Regeneration

12:30 pm – 1:30 pm

**Lunch on your own**  
**(Student Career Fair at the  
Charlotte Convention Center and  
Women's Luncheon and SIG  
Meetings at The Westin Charlotte)**

1:30 pm – 3:00 pm

**Poster Session II**  
*(in Exhibit Hall)*

3:00 pm – 5:00 pm

**Concurrent Session VII**

- Biomimetic Materials for Tissue  
Engineering 2
- Ceramics and Composites in Bone  
Tissue Engineering and Drug  
Delivery 2
- Molecular Mechanisms Governing  
Protein-Surface and Cell-Surface  
Interactions
- Engineering Tissue Interfaces
- 2nd Annual SFB Business Plan  
Competition
- Drug Delivery
- Bio-Inspired Cellular  
Microenvironments
- Panel Discussion:  
Polyurethanes: From Materials  
Development to Device Evaluation  
and Back Again

5:00 pm – 6:30 pm

**SFB Annual Business Meeting**  
**SFB National Student Chapter  
Meeting**

7:00 pm – 9:30 pm

**SFB BASH at the NASCAR  
Hall of Fame**

## SATURDAY, APRIL 18, 2015

7:00 am – 12:00 pm	Registration Open
7:00 am – 8:00 am	<b>ALL SIG Meeting at The Westin Charlotte</b>
8:00 am – 8:15 am	<b>Coffee Break</b>
8:15 am – 10:15 am	<b>Plenary Session III: Acta Biomaterialia Gold Medal</b> <i>Jack Lemons, University of Alabama at Birmingham</i> <b>Moderators:</b> <i>Linda Lucas, University of Alabama at Birmingham and Joel Bumgardner, University of Memphis</i> <b>Panel discussion will include:</b> <i>Art Coury, Genzyme (retired), Warren Haggard, University of Memphis, and Dane Miller Biomet (retired)</i>
10:15 am – 10:30 am	<b>Break</b>
10:30 am – 12:30 pm	<b>Concurrent Session VIII</b> <ul style="list-style-type: none"><li>• Vascular and Blood Cells Responses to Novel Cardiovascular Biomaterials</li><li>• Next Generation Biomaterial and Drug Delivery Technologies for Wound Healing</li><li>• Advanced Antimicrobial Materials 2</li><li>• Tissue Engineering 2</li><li>• Drug Delivery 2</li><li>• Innate Immunity and Inflammation in Biomaterials Contexts</li><li>• Biomaterials for Regenerative Engineering 2</li><li>• Panel Discussion: Progress and Challenges in Basic Science and Translation of Orthopaedic Biomaterial-Associated Infections</li></ul>

## Hotel Information/Reservations

For your convenience, sleeping rooms have been reserved at **The Westin Charlotte**. The hotel can be contacted directly for individual reservations and they are on a first-come, first-serve basis. Please be sure to reference the Society For Biomaterials or SFB 2015 Annual Meeting & Exposition when making reservations.

**The special room rate will be available until March 20, 2015 or until the group block is sold-out. After this date the prevailing rates for the hotel will apply.**

To reserve a room at the group rate, visit the SFB website or contact the hotel directly by calling 704-375-2600, please be sure to reference the Society For Biomaterials.

The Westin Charlotte  
501 South College Street  
Charlotte, North Carolina  
704-375-2600

### CONFERENCE RATES:

Sleeping room rates have been reserved for attendees at a conference rate of \$198 single/double occupancy plus 15.25% tax rate.

Conference rates are available from April 12, 2015 to April 19, 2015.

## General Information

### ABSTRACT PUBLICATION

If you would like a printed copy of all the abstracts, you may pre-purchase a Transactions Book through online registration. You will be given the Transactions Book upon check-in at the registration desk. **This offer is only available to those who register by March 30, 2015.**

### BADGES

Please pick up your conference badge at the registration desk (Charlotte Convention Center, Level 1, Lobby C) upon your arrival to the conference. You must wear your badge throughout the conference as it is to identify you as a SFB 2015 Annual Meeting & Exposition attendee. If you misplace your badge, please go to the registration desk for a replacement.

### BIOMATERIALS BASH

Join your colleagues at the NASCAR Hall of Fame for the 2015 Biomaterials Bash held Friday, April 17, 2015 from 7:00 pm – 9:30 pm. Along with traditional exhibits, it is fueled with more than 50 interactive experiences and realistic racing simulators.

### CERTIFICATE OF ATTENDANCE

You may pick up a Certificate of Attendance on-site at the registration desk.



### CURRENCY EXCHANGE

Currency exchange services can be found in the airport at Traveler mobile carts, located in the Atrium, Concourse D (from 2:00 pm – 8:00 pm only), and Ticketing-Zone D. Automated teller machines (ATMs) are located throughout the airport.

The Charlotte Convention Center does not offer international currency exchange, but The Westin Charlotte does have currency exchange through the hotel's front desk.

### DRESS CODE

Business casual is the recommended dress for the meeting.

### PASSPORTS AND VISAS

All persons traveling by air outside of the United States (U.S.) are required to present a passport or other valid travel documentation to enter or re-enter the U.S. You can find more information on U.S. Customs and Immigration at [www.dhs.gov](http://www.dhs.gov).

Before traveling to the U.S., a citizen of a foreign country must generally obtain a nonimmigrant visa for temporary stay. If a visa is required, please contact Society For Biomaterials' Meeting Coordinator, Sarah Mercer at [smercer@biomaterials.org](mailto:smercer@biomaterials.org) to receive documentation explaining your intended purpose of travel to the U.S. Visa applicants should apply well in advance of their travel departure date.

For more information on passports and visas, please visit <http://travel.state.gov/>.

The official language of the meeting is English.

### REGISTRATION

All attendees are encouraged to pre-register for the meeting. By registering early, attendees can benefit from a reduced rate much lower than that offered on-site. To take advantage of this economic offer, register by March 30, 2015 as part of our Early Bird Registration. Conference Pre-Registration ends April 7, 2015. Attendees can register via the SFB Conference website, [2015.biomaterials.org](http://2015.biomaterials.org), or by using the paper form attached to this brochure.

All registration fees include: admittance to all scientific sessions, panel discussions, exhibits, opening reception, poster and exhibition reception, breaks and the BASH. Additional fees apply to Wednesday workshops.

### MEMBER RATES

Member rates apply to members of the Society For Biomaterials, USA and other world biomaterials congress societies such as Australian Society for Biomaterials, European Society for Biomaterials, the Japanese Society for Biomaterials and Korean Society for Biomaterials and TERMIS. Members of TERMIS or world biomaterials congress societies must provide a copy in order to receive a promotion code prior to registering.

Full-time students and Post-graduates receive a discounted registration rate. To qualify for discounted registration rates, proof of full-time student or post-graduate status must be uploaded during the online registration process or sent via e-mail to Society For Biomaterials' Membership Coordinator, Rebecca Riedesel at [riedesel@biomaterials.org](mailto:riedesel@biomaterials.org).

### REFUNDS

To cancel your registration and receive a refund, a written request must be received by April 7, 2014. Cancellations can be made by contacting Society For Biomaterials' Meeting Coordinator, Sarah Mercer at [smercer@biomaterials.org](mailto:smercer@biomaterials.org) or at 856-642-4439. Cancellation requests received by this date will receive a refund minus a \$75 processing fee. Requests will be processed upon notification. All requests received after April 7, 2014, will forfeit 100 percent of monies paid.

### SESSION LOCATIONS

All sessions of the meeting, including exhibits, posters and oral presentations, will take place at the Charlotte Convention Center. Additional committee meetings, board and council meetings and luncheons will take place at The Westin Charlotte.

### SPECIAL NEEDS

The Society For Biomaterials wishes to take steps to ensure that no disabled person is excluded, denied services, segregated or otherwise treated differently than other individuals because of the absence of auxiliary aids and services. If you require any auxiliary aids or services identified in the Americans with Disabilities Act, please contact Society For Biomaterials' Meeting Manager, Melynda Johnson at [mcjohnson@biomaterials.org](mailto:mcjohnson@biomaterials.org) or 856-642-4423.

### SPONSORSHIP AND EXHIBITS

Each year, the Society For Biomaterials Annual Meeting & Exposition serves as the central gathering point for the entire biomaterials field. This year's Annual Meeting in Charlotte promises to offer an exciting interaction between meeting registrants and exhibitors.

In order to provide exhibitors with steady exposure to meeting attendees, all coffee breaks and poster sessions will be held exclusively in the exhibit area. This format encourages frequent contact and dialogue between biomaterials scientists in industry, academia and the exhibiting companies.

For more information on exhibiting and sponsorship opportunities, please visit the exhibitor page of the Society's Annual Meeting website ([2015.biomaterials.org](http://2015.biomaterials.org)) and download the Exhibitor and Sponsorship Prospectus or contact:

#### **Melynda Johnson, Meeting Manager**

856-642-4423 • [mcjohnson@biomaterials.org](mailto:mcjohnson@biomaterials.org)

## EXHIBIT HOURS

### Wednesday April 15, 2015:

Exhibit Set-Up: 9:00 am – 5:00 pm

Poster Set-Up: 3:00 pm – 6:00 pm

Opening Reception with Posters: 6:00 pm – 8:15 pm

### Thursday, April 16, 2015

Exhibits Open: 10:00 am – 1:30 pm; 3:30 pm – 7:00 pm

Exhibit Reception & Poster Session I: 5:30 pm – 7:00 pm

### Friday, April 17, 2015

Exhibits Open: 10:00 am – 3:00 pm

Poster Session II: 1:30 pm – 3:00 pm

Tear Down: 3:00 pm – 6:00 pm

## TRANSPORTATION

### *Charlotte Douglas International Airport*

Charlotte Douglas International Airport (CLT) is located approximately 7 miles from The Westin Charlotte, which is right next door to the Charlotte Convention Center. The airport serves most major airlines.

### *Airport Transportation Options*

There are several forms of transportation available for getting from the Charlotte Douglas International Airport to uptown Charlotte, where The Westin Charlotte and Charlotte Convention Center are located.

**RCT** is a day or night town car service, eliminating the worry of waiting for a cab. The driver will meet you with a name placard inside the airport. The fee is approximately \$70 all-inclusive from the hotel to the airport. RCT runs 24 hours and the travel time to The Westin Charlotte is 13 minutes. To make a reservation, call 704-522-8258. Reservations are required for this service.

**The Yellow Cab** service is also a great option of transportation in the Charlotte area. The Yellow Cab Service offers a rate of \$17-\$20 from the airport to The Westin Charlotte and a \$21-\$24 rate to the airport. Fares do not include gratuity. You can hail a taxi right from the airport or download the Taxi Magic app straight to your smartphone to book a pick up time in advance.

Another option for transport in the Charlotte area is **Uber**. Uber is a black car service that acts much like a taxi. You have the option of taking an UberX (seats four) and UberBlack (seats four). UberX will cost you anywhere from \$14-\$19 from the airport (depending on traffic), UberBlack comes in at around \$45. Please keep in mind this is a great option for those traveling in a group as the fare is a flat-rate and can be split. Uber also allows for a cash free ride. Once you arrive at your destination, your fare is automatically charged to your credit card on file via the Uber app — no need to tip. You will be emailed a receipt. For more information on Uber, please visit [www.uber.com](http://www.uber.com) and be sure to download the Uber app to your smartphone.

## VISITOR INFORMATION

### *Local Attractions*

Attractions located 5-10 minutes walking distance from the Convention Center:

- Nascar Hall of Fame
- The Charlotte Epicentre, a popular entertainment center, only half a mile away from The Westin Charlotte and the Convention Center, the Epicentre includes excellent dining options, fun and thriving nightlife and musical entertainment and a wide variety of shopping
- Carowinds Amusement Park, a 17-minute drive from The Westin Charlotte

The **LYNX Light Rail** runs 7 days a week from 5:00 am – 1:00 am and serves 15 convenient stations around uptown Charlotte. The LYNX has a stop located at The Westin Charlotte and the local fare is \$2.20. With multiple stops in uptown Charlotte, the LYNX Light Rail is a convenient way to access Charlotte's best shopping, museums, dining and entertainment.

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## Registration Form (Please print or type)

First Name \_\_\_\_\_ Surname/Last Name \_\_\_\_\_  
 Title \_\_\_\_\_ Degree \_\_\_\_\_  
 Speciality or Discipline \_\_\_\_\_  
 Affiliation \_\_\_\_\_ Department \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State/Province \_\_\_\_\_ ZIP/Postal Code \_\_\_\_\_ Country \_\_\_\_\_  
 Telephone \_\_\_\_\_ Facsimile \_\_\_\_\_  
(For international numbers, please include country and city codes.)  
 Email \_\_\_\_\_ Special Requests (ADA, Dietary, Etc.) \_\_\_\_\_  
 Member in which Society?  Society For Biomaterials, USA  Other WBC Society (list) \_\_\_\_\_ Member Number \_\_\_\_\_

3 OPTIONS TO REGISTER: 1. www.biomaterials.org 2. Fax form to 856-439-0525 3. Mail to 1120 Route 73 • Suite 200 Mt. Laurel, NJ 08054	ON OR BEFORE MARCH 30, 2015								AFTER MARCH 30, 2015							
	Registration for Paid Members				Registration for Non-Members'				Registration for Paid Members				Registration for Non-Members'			
	Member	Post Grad	Student	Retired Senior	Non-Member	Non-Member Post Grad	Non-Member Student	Retired Senior	Member	Post Grad	Student	Retired Senior	Non-Member	Non-Member Post Grad	Non-Member Student	Retired Senior
Meeting & Exhibit Registration	<input type="checkbox"/> \$525	<input type="checkbox"/> \$355	<input type="checkbox"/> \$190	<input type="checkbox"/> \$160	<input type="checkbox"/> \$720	<input type="checkbox"/> \$455	<input type="checkbox"/> \$220	<input type="checkbox"/> \$160	<input type="checkbox"/> \$625	<input type="checkbox"/> \$405	<input type="checkbox"/> \$225	<input type="checkbox"/> \$195	<input type="checkbox"/> \$820	<input type="checkbox"/> \$555	<input type="checkbox"/> \$250	<input type="checkbox"/> \$195
Workshop 1: Cell-Based Bio-Manufacturing	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50
Workshop 2: Drug Eluting Stents and Beyond	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50
Workshop 3: Testing Methods for Performance Prediction of Materials and Devices	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50
Workshop 4: Biomaterial Degradation Analysis	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50
Workshop 5: Recent Advances in 3D Printing of Biomaterials	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50
Workshop 6: Surface Modification and Characterization of Biomaterials: Concepts, Principles, and Latest Developments	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$50
Include Dues Renewal	<input type="checkbox"/> \$195	<input type="checkbox"/> \$100	<input type="checkbox"/> \$80	<input type="checkbox"/> \$70					<input type="checkbox"/> \$195	<input type="checkbox"/> \$100	<input type="checkbox"/> \$80	<input type="checkbox"/> \$70				

- Student Mentoring Lunch** (Friday, April 17, 12:30 pm – 1:30 pm)
- Women in BME Leadership Seminar & Luncheon** (Friday, April 17, 12:30 pm -1:30 pm)  
*Lunch will be provided and you must check this box if you intend to participate as this is a ticketed event, limited to the first 100 women members only.*

### Optional Transactions

- Transactions Book** Quantity:   \$100; Member  \$125; Non-Member

### Guest Registration (includes Opening Reception, Exhibition Reception and Bash)

Extra tickets for Accompanying Guests (#) \_\_\_\_\_ X  \$75 each (name of guest): \_\_\_\_\_

### \*Student and Post-Graduate status verification required.

- I attest the named individual is a full-time, degree-seeking student.
- I attest the named individual is a post-graduate, degreed individual in training at an academic institution, e.g., a resident or post-doc.

Signature of advisor or department chair \_\_\_\_\_  
 Advisor's printed name \_\_\_\_\_  
 Advisor's telephone \_\_\_\_\_  
 Advisor's email \_\_\_\_\_

### Method of Payment:

- Check enclosed (Checks must be in U.S. dollars, drawn on a U.S. Bank and made payable to the Society For Biomaterials)  MasterCard  VISA  American Express

Name (as it appears on card) \_\_\_\_\_ Card # \_\_\_\_\_  
 Expiration date \_\_\_\_\_ Cardholder signature \_\_\_\_\_

### New & Renewing Members ONLY:

- Optional Subscriptions:**
- |  |                                   |  |  |
|--|-----------------------------------|--|--|
| Journal of Biomedical Materials (in print)       | US <input type="checkbox"/> \$150 | Canada <input type="checkbox"/> \$160                    | Outside North America <input type="checkbox"/> \$238 |
| (E-Journal included above)                       |                                   |  |  |
| Acta Biomaterialia                               |                                   | <input type="checkbox"/> \$144 PLUS VAT where applicable |  |
| Biomaterials                                     |                                   | <input type="checkbox"/> \$259 PLUS VAT where applicable |  |
| Journal of Biomaterials Science, Polymer Edition |                                   | <input type="checkbox"/> \$344 print                     | <input type="checkbox"/> \$172 online                |

### Special Interest Group (ONE FREE, \$10 for each additional, free for students)

- |   |  |
|---|--|
| <input type="checkbox"/> Biomaterials and Medical Products Commercialization          | <input type="checkbox"/> Drug Delivery                             |
| <input type="checkbox"/> Biomaterials Education                                       | <input type="checkbox"/> Immune Engineering *NEW*                  |
| <input type="checkbox"/> Biomaterials Tissue Interaction (formerly Implant Pathology) | <input type="checkbox"/> Nano Materials                            |
| <input type="checkbox"/> Cardiovascular Biomaterials                                  | <input type="checkbox"/> Ophthalmic Biomaterials                   |
| <input type="checkbox"/> Engineering Cells and Their Microenvironments                | <input type="checkbox"/> Orthopaedic Biomaterials                  |
| <input type="checkbox"/> Dental/Craniofacial Materials                                | <input type="checkbox"/> Protein & Cells at Interfaces             |
|   | <input type="checkbox"/> Surface Characterization and Modification |
|   | <input type="checkbox"/> Tissue Engineering                        |

**Registration Subtotal:** \_\_\_\_\_

**Transaction & Social Registration Subtotal:** \_\_\_\_\_

**TOTAL DUE:** \_\_\_\_\_

BY HORST VON RECUM, 2014-15 MEMBER-AT-LARGE



### GREETINGS MEMBERS!

I have enjoyed hearing from you all this past quarter. As a reminder, in my role as Member-at-Large I represent you, the overall members of the Society. In this capacity, I serve as an unencumbered representative of the

members on both the Board of Directors and the council of the Society. In this representative role, I am a member of other Society For Biomaterials (SFB) committees, such as the Long Range Planning Committee, Bylaws Committee, Membership Committee and Program Committee. As such, I hope I have a clear voice in the direction of the Society, and that my participation in these committees and governing bodies ensures all voices can be heard. I continue to encourage all members to bring forth ideas about the Society and anything else relevant to making the Society better. This forum is a great way to catch up on what is happening in our community and see how SFB members are impacting the field. Please send news for future issues! As usual, SFB members have been very active and productive in the past quarter.

**Dr. Mark Byrne** was named professor and inaugural chairman of the new Biomedical Engineering Department in the College of Engineering at Rowan University (Glassboro, New Jersey). Dr. Byrne has a broad research program across the fields of biomaterials engineering, controlled therapeutic delivery, pharmaceutical engineering, polymer engineering and medical devices. Prior to coming to Rowan, he served as the Daniel & Josephine Breeden Distinguished Associate Professor in the Samuel Ginn College of Engineering at Auburn University in Alabama.

**Dr. David Castner** from the University of Washington reports that The National ESCA and Surface Analysis Center for Biomedical Problems (NESAC/BIO) has received an additional 5 years of funding from the NIH (grant EB-002027). NESAC/BIO ([nb.uw.edu](http://nb.uw.edu)) has been funded by the NIH since 1983. Buddy D. Ratner was the NESAC/BIO director from 1983 through 1996. David Castner has been the NESAC/BIO director since 1996. The new grant award now extends NESAC/BIO's NIH funding through November 2019. NESAC/BIO has projects in technology research

and development (TRD), collaboration research, service, training and dissemination. The major TRD thrusts for the coming 5 years are development of time-of-flight secondary ion mass spectrometry (ToF-SIMS) methods for imaging, sputter depth profiling and 3D analysis of complex organic materials, cells and biological tissues; characterization of the surface composition and structure of nanoparticles with electron spectroscopy for chemical analysis (ESCA) and sum frequency generation (SFG) scattering and vibrational spectroscopy; and developing multi-technique approaches for characterizing the structure and interactions of biomolecules with interfaces. Furthermore, the NESAC/BIO was also awarded an NIH High End Instrumentation grant last summer to purchase a new imaging SIMS instrument.

**Dr. Ankur Singh**, Assistant Professor at Cornell University (Ithaca, New York), was named a 2014 Cellular and Molecular Biomedical Engineering Young Innovator at the Biomedical Engineering Society annual meeting. Dr. Singh's research efforts center on creating functional immune organs, modulating the behavior of immune cells and understanding stem cells by integrating innovative biomaterials, micro-nano-scale technologies and core concepts of immunology. The overall goal of Singh Lab is to understand the fundamentals of cell-material interactions, immune responses, underlying cell mechanics and signaling; and to establish bioengineering strategies for cancers, infections and tissue regeneration. Specific translational healthcare technologies developed so far focus toward finding cures for lymphoma, multiple myeloma, bone marrow disorders and osteoarthritis.

**Dr. Khalid Kader**, a graduate of Case Western Reserve University (Cleveland, Ohio) and former faculty at the University of Iowa in Biomedical Engineering, reports on a new position in biomaterials research. His past research was on endothelial cell adhesion and quiescence on engineered surfaces. Now he is at the naval shipyard at Puget Sound (near Seattle, Washington) working on modeling seawater as a biological fluid, using biomedical surfaces design techniques to eliminate sea life adhesion.

**Dr. Thomas J. Webster**, chair of chemical engineering at Northeastern University (Boston, Massachusetts) and

President-Elect of SFB had multiple happenings this quarter. He won a distinguished lecture award for Institute of Cell Engineering and Regenerative Medicine from the University of Florida. He appeared on Thomson Reuters list of Highly Cited Researchers 2014 ([highlycited.com](http://highlycited.com)). Dr. Webster was also awarded a patent in collaboration with Dr. Hicham Fenniri for using “nanotubes and compositions thereof” on the surfaces of implants. Additionally, Dr. Webster was interviewed by New England Cable News (NECN) to discuss the use of nanomedicine to fight Ebola and other diseases. He was also featured in an article in InSolution entitled, “Attack Ebola on a Nanoscale.” Last, Dr. Webster was elected Fellow of the Ernst Strungmann Forum ([esforum.de](http://esforum.de)).

### *In Memoriam*

**Thomas M. Valega**, a chemist and former grants administrator at the National Institutes of Health (NIH), National Institute of Dental Research, died Jan. 28, 2014 at his home in Warren, Minnesota, at age 76.

Dr. Valega began working at the Agriculture Department’s Research Center in Beltsville, Maryland, in 1967, but spent most of his career at NIH, including stints in the artificial kidney program and the dental research program. He retired in 1990. Dr. Valega was born in Linden, New Jersey, and graduated from Rutgers University in New Brunswick, New Jersey in 1959, where he received a doctorate in chemistry in 1965.

## A Tutorial: How to be an SFB Member for 39 years

### Historical Flashback

BY GUIGEN ZHANG, CLEMSON UNIVERSITY



For this issue’s Historical Flashback, I asked Dr. Buddy D. Ratner of the University of Washington to give us some of his perspectives from his experience with SFB. Chances are, you probably have read one or more of his many books about biomaterials.

Dr. Ratner is more than a prolific

author, he is a giant in the field of biomaterials science. He was the winner of 1989 Clemson Award for contribution to literature and served as the president of SFB from 1991 to 1992. In Dr. Ratner’s kind response to my request, he reflects on his 39 years of involvement with SFB, spanning from his very first SFB meeting (which happened to be the first SFB/seventh IBS meeting held at Clemson University) to the last one in Denver, Colorado, where he wrote an information-rich and fun-to-read piece. In his own words:

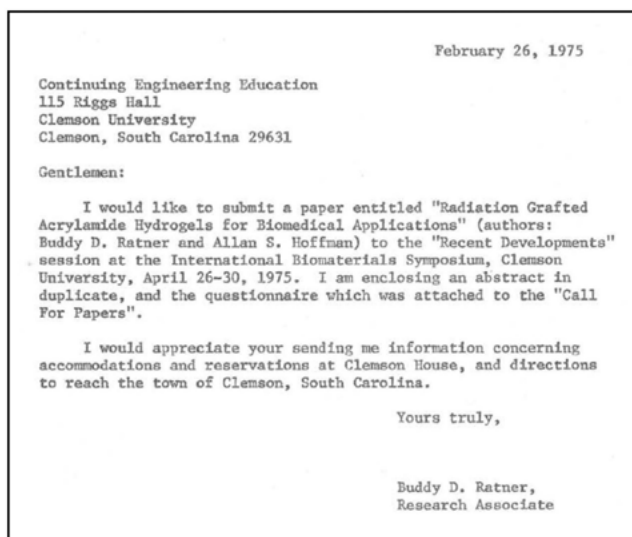
*The glib response to the title above is “live long enough and pay your dues each year.” More to the real intent of this mini-history, I hope to demonstrate that by seriously immersing yourself in the life and community of the Society*

*For Biomaterials, rewards, often unexpected, will accrue.*

*In May 1972, after receiving my PhD in Brooklyn, I traveled to Seattle to do a postdoctoral fellowship with Professor Allan Hoffman, who, at that time, was one of just a handful of researchers exploring a new class of materials called hydrogels (isn’t that a contrast to today with thousands of researchers working with hydrogels). Our research on the radiation grafting of hydrogels to hydrophobic polymers yielded exciting results (Figure 1) and in 1975 I submitted an abstract to the seventh International Biomaterials Symposium (IBS) to be held at Clemson University. The abstract was accepted (Figure 2). I presented my first professional talk on April 27, 1975, in a session where another young biomaterials scientist, Jim Anderson, was also presenting. This was a propitious year for SFB, in that, after being launched in 1974, SFB held its first meeting concurrently with the IBS meeting.*



**Figure 1.** Professor Allan S. Hoffman holding a radiation grafted hydrogel (wettable) and Dr. Buddy D. Ratner holding the ungrafted silicone substrate (water beads up on it), 1974.



**Figure 2.** The original submission letter for Dr. Buddy D. Ratner's first presentation at a scientific meeting (typed on a typewriter).

*My abstract submission to IBS is important to this story because of the unique nature of those early Clemson biomaterials meetings. One element of the meetings that originated at Clemson was The Bash. The Bash, in the early 1970s, was conceived as an opportunity to meet and socialize. The whole IBS meeting had less than 200 participants. The Bash was held in a rather bland room on campus. There were round tables holding perhaps 8-10 people. On each table there was a bowl of boiled, unshucked gulf shrimp, a bowl of green salad and, beside each table, a plastic trash can filled with ice and cans of beer. Maybe water was available for those who did not drink beer? The group was small, everyone was excited about this emerging field called biomaterials and the beer served as a universal solvent allowing a fledgling scientist (me) with no reputation and four freshly published papers on his CV, to socialize with the intellectual leaders and senior scientist of this new field. So I got to meet Bill Hall, Solomon Pollack, Sam Hulbert and so many of the early thought leaders of SFB and the biomaterials field.*

*I joined SFB (paid my dues) in its first year of real operation, 1976. For 2 years I received no correspondence from SFB, nor did I receive my promised subscription to Journal of Biomedical Materials Research (JBMR). Finally, at another of those early meetings of SFB, I just marched right up to someone of the society leadership and complained. Now I was a recognized entity — some annoying kid with problems that the rather loose administrative system of the nascent society was incapable of dealing with. Still, after bit more complaining, my membership issues were addressed. I continued attending annual meetings each year, meeting people, presenting papers and enjoying the convivial social life of early SFB.*

*In 1979, I was appointed by the president of SFB as the local arrangements chair for the next Annual Meeting. However, the next Annual Meeting turned out to be the First World Biomaterials Congress, to be held in Baden (near Vienna, some 7,000 miles from Seattle). Actual local arrangements were, for that reason, left to the World Congress organizing*

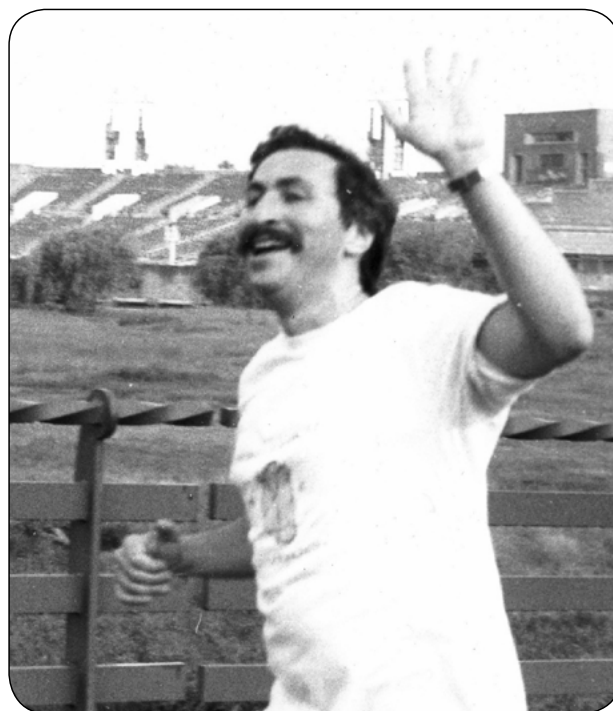


committee. For the need to be involved in my SFB council position, I applied to the NSF for a travel grant to cover costs for some of our members and I also communicated with members about the details of the meeting. Communication meant letters (with stamps on them), since the Internet did not go public until 1981 and the first Internet browser did not appear until about 1991. We also promoted the World Congress in the Torch newsletter. My application to the NSF was successful and that greatly increased U.S. participation in the World Congress (note that international travel was infrequent and expensive back then). This small success as local arrangements chair led to a number of council positions — I was on the SFB council for 14 years in a row.

In 1983, I was appointed the program chair for the Annual Meeting, which was to be held in San Diego. Annual meetings each had about 200 participants up to that point. Meeting coordination was handled completely through the office of the program chair — there was no national office for SFB in that era. Quite to everyone's surprise, about 400 people registered for that meeting, which certainly strained my office staff and also strained the facility (the Del Coronado Hotel) to accommodate us. The size of the meetings continued to increase every year until they reached present levels (most always greater than 1,100 attendees). Two developments stemmed from the San Diego meeting. First, we started thinking about a national office (which was first located in Birmingham, Alabama) staffed by a full-time SFB employee to run our meetings and membership issues. Second, the meetings became much larger and it was more difficult to socialize and feel a sense of community in SFB. It was the growth in SFB annual meeting attendance, and the expansion of ideas in biomaterials, that led me to propose in 1990 the concept of the special interest groups (SIGs). I figured that if attendees could readily meet up with researchers with common interests, communication and socialization would be simplified. The SFB council hated my idea ("It will be divisive for the SFB."), but I put my neck on the line and tried a radical

experiment. At the SFB meeting in Scottsdale (maybe 1991) I posted sign-up sheets for SIGs near the registration area. There were substantial numbers of sign-ups for 10 proposed SIGs, which demonstrated to the SFB council that the SIG idea had support from the membership. SIGs would also allow many more members to move to leadership roles in the society. Finally, SIGs provided a mechanism for SFB to respond to new developments in biomaterials (for example, think about the explosive growth in 3D printing and bioprinting). The SIGs have become a pivotal element of SFB. They have fulfilled my expectations and I feel a pleasant sense of pride for this contribution.

In 1987, at the New York City SFB meeting, I ran in a 5K fun run. I took the trophy for the fastest time in the "over 40" category (Figure 3). Note that I was the only one running in that category.



**Figure 3.** Dr. Buddy D. Ratner approaching the finish line in Flushing Meadows Park, New York, at the 1987 SFB 5K Fun Run.

*In 1991 I was elected President of SFB. SFB had budgetary issues and issues with managing SFB growth. There were concerns with the management of the SFB national office. But, overall, I was happy to serve and hugely gratified that the SFB membership found me worthy of this role, especially considering the illustrious biomaterials scientists and leaders that preceded me in that office. That was quite a ride — from unshucked shrimp and a plastic trash can of beer to president of the SFB. And the ride is not over. I still attend every SFB meeting (I've never missed a meeting, and this year I'll participate as a lecturer in a surface analysis workshop and a panel session on technology commercialization).*

*SFB still evokes a feeling of family for me. Generations of my students, colleagues, friends and collaborators are present each year and it's great to catch up technically and socially with them (Figure 4), and I get to meet the new generation of biomaterials scientists. How many of you will be at SFB 2054 (39 years from now)? I hope to be; maybe advances in biomaterials will make that possible?*

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**Figure 4.** Socializing with friends and colleagues at the 2014 SFB Annual Meeting in Denver. From left to right, Floyd Karp, Eric Sussman, Guigen Zhang, Shrojal Desai, Buddy D. Ratner, Ji Guo, Qijin Lu and Peter Edelman.

BY STEVE LIN, INDUSTRIAL NEWS CONTRIBUTING EDITOR



The Google-backed venture **Calico**, which seeks to develop anti-aging technology, announced in early September that it will create an anti-aging drug research center in the San Francisco Bay Area through an up-to-\$1.5-billion partnership with pharma company **AbbVie**. AbbVie and

Calico initially each ponied up \$250 million to fund the collaboration, with the potential for both sides to contribute an additional \$500 million. Last year, the popular press latched onto the notion that Google was working to “solve death.” That phrase even made it onto the cover of Time magazine. The Wall Street Journal released a cartoon poking fun at the notion, stating that Google would get back to improving its search engine after it had solved immortality.

**Becton Dickinson** (BD) announced that it will acquire **CareFusion** for \$12.2 billion in a bid to save costs and broaden the company’s offerings to hospitals. With \$8.3 billion in annual sales, BD sells diagnostics, diabetes care products and drug delivery devices like catheters. The acquisition of CareFusion will add about \$3.8 billion in annual revenue through sales of infusion pumps, ventilation and respiratory products, surgical instruments and software-based solutions. The deal is expected to close in the first half of 2015. The release says that BD has identified \$250 million in synergies that it will achieve by 2018. The company will suspend its annual share repurchases, worth \$400 million, until its debt level comes down. BD CEO Vincent Forlenza said in a statement that the acquisition will accelerate the transition from “a product-focused company to a customer-centric provider of innovative healthcare solutions with leading scale across the medication management value chain and expanded solutions for patient safety.”

**STERIS Corporation** (Mentor, Ohio) and **Synergy Health, plc** (Swindon, U.K.) announced that STERIS is commencing a “recommended offer” under U.K. law to acquire Synergy in a cash and stock transaction valued at £19.50 (\$31.35) per Synergy share, or a total of approximately \$1.9 billion, based on STERIS’s closing stock price of \$56.38 per share on Oct. 10, 2014. For medical device manufacturers, STERIS’s Isomedix and Synergy’s Applied Sterilization Technologies (AST) will create a leading global supplier to best serve medical device customers with a network of 58 facilities covering 18 countries. For hospitals, the combination of STERIS’s infection, prevention and services businesses with Synergy’s hospital sterilization services will strengthen and accelerate the development of hospital sterilization outsourcing worldwide. The new STERIS will be incorporated in the U.K., while its operational and U.S. headquarters will remain in Mentor, Ohio.

**Wright Medical Group Inc.** (Memphis, Tennessee), a U.S. maker of bone implants, will merge with **Tornier NV**, creating a new company valued at \$3.3 billion as part of the latest proposed tax inversion because of the recently announced tighter rules. This combined company will have the most comprehensive upper and lower extremity product portfolios in the market. The legal address for the new company, to be called Wright Medical Group NV, will be in the Netherlands, where Tornier has been based for about 8 years. Each outstanding share of Wright will be exchanged for 1.0309 shares of Tornier, giving Wright’s shareholders 52 percent of the combined company when the transaction is completed. The deal provides a 28-percent premium for Tornier’s shareholders compared with the company’s closing price of \$23.59 on Oct. 24.

**Bone Therapeutics**, the regenerative therapy company in the fields of bone diseases and orthopaedics, and **Kasios**, the synthetic bone substitute specialist, announced a 2-year collaboration to develop a novel product for spinal fusion procedures. The collaboration combines Bone Therapeutics’ allogeneic osteoblastic cell therapy product ALLOB<sup>®</sup> with Kasios’s synthetic micro-granules bone substitute. The combination of Bone Therapeutics’ ALLOB<sup>®</sup> cells with Kasios’ TCP’s osteoconductive micro-granules has the potential to enhance 3D growth and bone growth in spine fusion, bringing advantages in stability and structure.

The price for putting a faulty device out on the market is steep. This is what orthopedics device company **Stryker** is realizing after agreeing to an out-of-court settlement related to its recalled Rejuvenate Modular-Neck and/or ABG II Modular-Neck Hip Stems. The Kalamazoo, Michigan, company announced that it has settled a class action lawsuit involving New Jersey plaintiffs and a federal, multi-district litigation in Minnesota, for which it is taking a cumulative charge of \$1.43 billion. Under the terms of the settlement, Stryker will provide a base payment of \$300,000 to patients who were implanted with the Rejuvenate or ABG II hip systems and were forced to undergo revision surgery by Nov. 3 to remove and replace the defective devices. Stryker may have to pay patients more than \$300,000 if they suffered “extraordinary medical injuries, such as multiple surgeries (re-revisions) or infections and other medical complications,” according to the law firm Lief Cabraser Heimann & Bernstein.

**Google Glass**, a head-mounted visual device, has already made quite a splash in hospitals, as the device is already serving as a useful tool in the operating room. Despite its slow start out of the gate on the general consumer market, it continues to make large waves in the realm of medicine as its potential uses continue to be uncovered. A UCSF study compared

performance on visual field tests with Google Glass versus regular eyewear to quantify their effects on visual function. The visual testing demonstrated significant blind spots in all three participants while wearing Google Glass, creating a clinically meaningful visual field obstruction in the upper right quadrant. The defects were induced by the Google Glass frame hardware design only, and were not related to a distracting effect of software-related interference. The news of the vision issues comes months after reports emerged that the device can cause headaches when used for long periods.

It seems the tight job market that plagued our industry in the years following the Great Recession has finally loosened up, giving way to higher salaries, new perks and more opportunity for workers in the medical device and diagnostic industries. The overall unemployment rate in the United States in early November was 5.8 percent. In the medical

device sector, the rate for the people over age 25 who have a college degree is 3.1 percent, which is nearly full employment. Median total compensation held steady over 2013, at \$130,000, but the median salary ticked up nearly 5 percent to \$110,000 according to *MD+DI's* 2014 Salary Survey.

A recent report from PricewaterhouseCoopers provides evidence that China is a market that medtech multinationals just cannot ignore. Between 2013 and 2017, **China's medtech market** is expected to grow at a compound annual growth rate of 20 percent, reaching nearly \$50 billion by 2017. In 2013, the Chinese medtech market was valued at \$23.7 billion. While the opportunity is large, there are several challenges. Medtech regulation in this populous nation is still being formulated and is expected to get tighter going forward.

## A Reviewer's Plight

Opinion

BY HOWARD WINET, ORTHOPAEDIC HOSPITAL, DEPARTMENT OF ORTHOPAEDIC SURGERY, UCLA

### COMPARE THESE TWO STATEMENTS:

1. *Acceleration of PLA-PGA hydrolysis is a good thing. We were brainstorming one day and a group member came up with the idea that inserting a lactide group into the middle of glycolide blocks might accelerate PLA-PGA hydrolysis. So we tried it and here is what we found.*
2. *Acceleration of PLA-PGA hydrolysis is a good thing. Jones (1992) developed a series of physical chemistry models for polyester chain structure and predicted that reduction of the tendency to form blocks would lower their activation energy for hydrolysis.\* Smith (1994), testing the prediction of Jones (1994), compared hydrolysis rates of a series of polyester enantiomers and corroborated her model. Based on these results we hypothesized that hydrolysis of our PLA-PGA would be enhanced if we adjusted our polymerization procedure to reduce blocking.*

If you were reviewing two abstracts for Society For Biomaterials (SFB), would the two approaches presented be rated the same? Of course, the words are different, but there is so much more to how they are weighed.

The first approach is an empirical solution to a problem. The test performed, or "tried," could have worked. But there is no evidence that the people performing this test learned anything about the mechanism by which PLA-PGA is hydrolyzed. At best this is an engineering approach. If SFB were an engineering society the abstract might get a passing grade.

The second approach is scientific. It establishes what is understood so far about the mechanisms of polyester hydrolysis. If the statement were in a full research paper, rather than an abstract, a more complete description of the mechanism would be expected. By stating such an understanding, the scientist commences the deductive reasoning process that will lead to the formulation of a prediction of what will happen to the speed of hydrolysis if one particular polyester is treated as so to reduce the incidence of blocking in its chain. This prediction is called a hypothesis. Testing of the hypothesis is the next goal, and the methods and materials section for such testing should follow in the abstract. Subsequently, the abstract would report the test results (i.e., data). This would be followed by the application of inductive logic to draw conclusions, which state, essentially, the level of confidence the researcher has that the hypothesis has been corroborated or if the falsifiable version of the hypothesis has been disproved by the data. If SFB were a scientific society, but wait! Isn't that what we are?

If we are a scientific society and the abstract submitters know this, why are more than half of the abstracts I receive to review more reflective of statement No. 1 than No. 2?

*\*No attempt is being made to describe real processes or references.*



# Coming Up in 2015

EVENT	DETAILS	WHEN & WHERE
5 <sup>th</sup> International Congress Biotechnologist for Spinal Surgery	Since launching BioSpine in 2002, the focus on high-end development of many new nano- and biotechnology products within the scope of spinal surgery has been extraordinary. Join in for fruitful conversations, vigorous discussions and the mutual exchange of knowledge.	April 8-11 Berlin, Germany Langenbeck-Virchow-House
SFB Annual Meeting	The theme for the 2015 Annual Meeting is <i>Driving Biomaterial Innovation and the Race to Translation</i> , a nod to the NASCAR-driving rebels that will host this year's annual meeting. It will focus on clinical translation of biomaterial research with major topics including Biocompatibility and Immune Engineering, Biofabrication and Multifunctional Design	April 15-18 Charlotte, North Carolina 601 South College Street
31 <sup>st</sup> Annual Southern Biomedical Engineering Conference (SBEC)	The SBEC emphasizes participation from young professionals and advanced students. Investigators present papers in the same sessions with the students and an author or co-author with a paper accepted will attend the conference to present their work and to interact with other attendees.	April 30-May 3 Kenner, Louisiana Crowne Plaza New Orleans Airport 2829 Williams Boulevard
5 <sup>th</sup> International Symposium Interface Biology of Implants (IBI)	The Symposium will include topics of generation of regenerative materials, extracellular matrix interaction, material induced biological responses, and mechanical control of cells.	May 6-8 Rostock, Germany Kurhaus Warnemünde
2 <sup>nd</sup> International Conference on Regenerative Biomedical Materials	The conference aims to bring together international researchers, to explore potential collaborations in a global environment and address new theories, new experimental findings and clinical translation on topics broadly related to regenerative biomedical materials.	June 4-8 Wuhan Wuhan, China Life Science Building, HUST 1037 Luoyo Road
Stem Cells: From Basic Research to BioProcessing	This event will highlight and discuss recent advances in strategies for controlling stem cell fate and reprogramming (including new insights into the molecular basis of pluripotency and differentiation) together with the progress towards therapeutic and bioprocessing.	June 9-11 London, United Kingdom Cineworld: The O2 Peninsula Square
ASAIO 61 <sup>st</sup> Annual Conference	ASAIO's (formerly known as the American Society for Artificial Internal Organs) mission is to provide a forum that globally and collaboratively promotes the development of innovative medical device technology at the crossroads of science, engineering, and medicine.	June 24-27 Chicago, Illinois 720 South Michigan Avenue
Advances in Tissue Engineering Short Course	This course will survey the latest knowledge and technologies in the world of patient-specific therapeutics — from transplantation of cells and tissues to artificial organs.	Aug. 12-15 Houston, Texas Rice University BioScience Research Collaborative 6100 Main Street
BioInterface Conference	The Surfaces in Biomaterials Foundation is dedicated to exploring creative solutions to technical challenges at the BioInterface by fostering education and multidisciplinary cooperation among industrial, academic, clinical, and regulatory communities.	Sept. 21-23 Scottsdale, Arizona 7575 East Princess Drive
6 <sup>th</sup> International Conference on the Mechanics of Biomaterials and Tissues	ICMOBT provides a unique international forum for researchers and practicing engineers from different disciplines to interact and exchange their latest results.	Dec. 6-10 Waikoloa Village, Hawaii Marriott Waikoloa 69-275 Waikoloa Beach Drive
The Science of Pain and its Management	This international event will discuss the latest research relating to the physiology, psychology, and pharmacology of pain; the psychosocial aspects of pain; and the assessment and management of pain.	Dec. 8 London, United Kingdom Cineworld: The O2

# News from the Educational SIG

## DON'T LECTURE, TEACH — THE WHAT, WHY AND HOW OF ACTIVE LEARNING

BY LISA BENSON, ASSOCIATE PROFESSOR, ENGINEERING AND SCIENCE EDUCATION, CLEMSON UNIVERSITY

Recently, I spoke with a post-doc about choosing a career in industry or academia. He was thinking academia. "I love my research, I love mentoring students," he said. "But, I hate lecturing." I did a double take then blurted, "Well, don't lecture." As he scratched his head and wondered aloud how he could refuse to teach, I quickly clarified, "No, no. Don't lecture — teach!" Many engineering and science faculty do not know how to implement — or are not even aware of — the many different ways to engage students in the classroom beyond lecturing. And the effort put into teaching is typically not recognized or rewarded, at least not at the same level as in the research lab.

### Teaching — Is It Worth It?

A recent meta-analysis of over 150 research studies on active learning indicates that it is indeed worth the effort of going beyond lecturing in the classroom.<sup>1</sup> Authors Freeman et al. from the Department of Biology at the University of Washington analyzed outcomes of studies comparing student performance on exams and concept inventories in science, technology, engineering and mathematics (STEM) courses that were primarily lecture format with those employing active learning techniques.

Accounting for variations in study methodologies, publication bias (the tendency to not publish results with small-effect sizes), student quality and instructor identity, the analysis revealed that students in active learning classes scored higher on course exams and even higher on concept inventories than their peers in traditional lecture-based classes. Students in lecture-based classes were 1.5 times more likely to fail than those in active learning classes. Although the effects were more pronounced in small classes ( $n \leq 50$ ), they were consistent across all class sizes, as well as across all STEM disciplines.

Empirical evidence is powerful stuff, yet many instructors resist the idea of changing the way they teach. Maybe some small steps are in order, rather than giant leaps. Active learning doesn't have to involve turning a class inside out. The real power of active learning is in taking that love for research and love for mentoring (that my colleague enthusiastically identified with) and transporting it into the classroom.

### What is Active Learning?

Any activity that engages students beyond just listening is technically active learning. When we lecture, we are basically telling students what they need to know. But students remember far more of what they say and do than what they hear and see. Sometimes lecturing is appropriate, but even a lecture can be modified by breaking it up with short activities that help students retain what they hear and see. Active learning can take place individually (reflections and minute papers) or in pairs and small groups. The latter approach is effective for generating ideas, questions, problem solutions and designs, and reinforces learning by having students explain what they know.

### How to Implement Active Learning

- Explain what you are doing and why — from the first day of class, emphasize to students that they will learn more if they are active rather than passive. Students may resist the idea because engagement requires more energy than listening to a lecture, and they may get the impression that you are not actually teaching. Get student buy-in early and often.
- Form groups where students are sitting — when acclimating students to active learning, save time by forming pairs or groups without shuffling the entire seating arrangement. This also gives students a sense of control over the activities.
- Assign roles — basic roles, such as a recorder/scribe, timekeeper and manager can be assigned to help focus students during group work. Occasionally different roles might emerge such as a liaison who asks the instructor questions or a technician who is in charge of calculations.

### BENEFITS OF ACTIVE LEARNING

- Improved attendance — class is now something different and attending is more worthwhile.
- Deeper questioning — students get to practice answering and generating questions.
- Higher grades and lower failing rates — research on outcomes of active learning is evidence of this!<sup>1</sup>

- Explain the task, including learning objectives — list what you want students to know or be able to do either orally or, especially for more complicated problems or activities, in a slide or handout.
- Ask students to report — call on individuals or groups randomly, both while working and when the activity ends. This is important to keep students accountable.
- Keep activities short — students will stay on task and it will reduce frustration for groups that are struggling.
- Circulate around the room — listen, give hints and check for understanding.
- Vary activities — to keep the class interesting, use different structures (pairs, groups) and formats (reflections, problem solving).

### Making Time for Active Learning

Our job as educators isn't to cover material, it is to uncover it! Ask, "How can I not afford to engage students to help them learn?"

- Reduce the time needed for note-taking — free up time by putting some of your class material on handouts, leaving gaps and inserting questions that point students back to the skills and concepts you want them to learn.
- Reduce the time needed for lecturing — post readings and videos online on a secure student server and assign viewing them outside of class to introduce topics. Follow up during class with activities and directed questions that apply concepts.

### Examples of Active Learning Methods<sup>2</sup>:

*In-class reflection* — form teams of two to four students and choose team recorders. Give teams 30 seconds to 3 minutes to reflect on course material and then collect responses by randomly calling on team recorders. Consider calling on people in the back of the room first to bring the whole room into the discussion.

Reflection methods include:

- Recall prior material or a previous lecture
- Answer or generate a question
- Start a problem solution
- Work out the next step in a derivation
- Think of an example or application
- Explain a concept
- Figure out why a given result may be wrong
- Summarize a lecture

*Think, pair, share* — pose questions for students to think about individually for about 30 seconds to 1 minute. Have students form pairs that first produce joint answers and share them with the class. Pairs may discuss answers with other pairs before sharing.

Sample questions include:

- How does \_\_\_ relate to what I've learned before?
- What conclusions can I draw about \_\_\_?
- What are the strengths and weaknesses of \_\_\_?
- What is the main idea about \_\_\_?
- What is the best \_\_\_ and why?
- What if...?
- Explain why...
- How are \_\_\_ and \_\_\_ similar?
- Why is \_\_\_ important?
- How would I use \_\_\_ to...?
- How does \_\_\_ affect \_\_\_?

*Cooperative note-taking pairs*<sup>3</sup> — students work in pairs during a class period to refine their notes. After a short lecture segment, give students time to summarize their notes to each other. Partners can add or correct information. This takes about 2 minutes and can be repeated two or three times during a class period.

*Guided reciprocal peer questioning*<sup>4</sup> — provide students with a set of generic question starters (see above for sample questions). Then, students individually prepare up to three thought-provoking questions about material from a class period or a reading. Questions are discussed in small groups at the beginning of the next class, and the whole class then discusses questions that were especially interesting or controversial in the group discussions.

*Paired programming* — two students actively collaborate on a computer-related task. One is the pilot and does the keyboarding, while the other is the navigator and identifies problems and thinks strategically. The two switch roles frequently.

*TAPPS: Thinking aloud paired problem solving*<sup>5</sup> — similar to paired programming, students form pairs to work on a problem, with one being the problem solver/explainer and one being the listener/questioner. This can take anywhere from 7-8 minutes to a whole class period, depending on the complexity of the problem. The problem solver talks through and writes out the solution or derivation. The listener questions, gives hints as needed and keeps the problem solver talking and writing. After several minutes the instructor stops the activity and collects feedback from listeners to check understanding. Pairs reverse roles and continue. Review the problem solution with the whole class.

*Minute paper*<sup>6</sup> — End the lecture or lesson about 2 minutes early and ask students to anonymously write down a summary of the main points of the class for the day/week or the least clear points from class on index cards or a half-sheet of paper. Collect and use the responses as a formative assessment to inform you on your teaching practice. Identify what students do and do not understand, and adjust your next class or provide support materials to address common questions. You can have students include their names if you want to address individual questions via email or during office hours.

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# Comparative Anatomy and Histology: A Mouse and Human Atlas

## Book Review

BY LYNNE JONES, BOOK REVIEW EDITOR



*Edited by: Piper M. Trueting and Suzanne M. Dintzis*  
*Publisher: Elsevier/Academic Press, New York, 2012*  
*ISBN: 978-0-12-381361-9*  
*Pages: 480, new or used from \$100-\$160*

Mouse models continue to play an important role in the study of biomaterials. Models vary from simple implantation models to the use of transgenic models to the study mechanisms of biological response. Necropsy studies require an in-depth appreciation of the anatomy and histology of a mouse, as well as an understanding of how these systems and tissues compare to humans. Over the years, I have come across many books and handouts on mouse anatomy to assist me in my interpretation of laboratory animals. I have found that *Comparative Anatomy and Histology: A Mouse and Human Atlas* is a great resource for my laboratory.

This book begins with a general discussion of Comparative Pathology (Chapter 1), Phenotyping (Chapter 2) and Necropsy and Histology (Chapter 3). Each of these chapters provide a pragmatic overview for what can be accomplished with proper planning and an understanding of what information can be gleaned from animal models. The remainder of the book is dedicated to specific systems and tissues within the body. Each chapter includes a detailed description of mouse anatomy and the histology

of the organs of interest. This is then compared to human anatomy and histology. Although the primary focus is on the mouse, there is enough detail provided about the human counterparts to serve as a basic text for human anatomy. Each chapter includes call-outs on specific need to know details. The quality of the schematics, gross photographs and photomicrographs is outstanding. And lastly, you can tell that considerable thought went into developing the Further Reading section at the end of each chapter.

I believe that this book is an outstanding textbook for comparative anatomy classes, as well as a resource for the animal laboratory. It is written in easy-to-understand language that can be followed by undergraduate students and new laboratory trainees. However, it provides enough detail to be a useful resource for more experienced researchers that are evaluating systems and tissues with which they are unfamiliar with.

### Other Books That May Be of Interest

- Wheater's Functional Histology — A Text and Colour Atlas. Barbara Young, Geraldine O'Dowd, Phillip Woodford. Elsevier. Churchill Livingstone, 2014.
- The Laboratory Mouse, 2<sup>nd</sup>. Peggy J. Danneman, Mark A. Suckow, Cory Brayton. CRC Press, 2012.
- Handbook of Laboratory Animal Science. 2<sup>nd</sup>. Jann Hau, Steven J. Schapiro, Gerald L. Van Hoosier Jr. (Editors). CRC Press, 2005.



## WHO IS TEACHING TEACHERS TO TEACH?

BY YUSEF KHAN, EDUCATION NEWS CONTRIBUTING EDITOR



Although this may vary to some degree, it is safe to say that a typical tenure-track professor is asked to develop an independent research program, garner national attention for those efforts and teach courses related to his/her area of expertise. While in training, graduate students and

postdoctoral fellows prepare for these tasks by learning experimental design, statistical analysis, various laboratory techniques, manuscript preparation, presentation preparation and grant writing to name a few. What is missing from this training is preparation for teaching.

To be fair, a small, but growing, number of institutions offer teaching workshops for graduate students and postdoctoral fellows, these workshops can be extensive, lasting an entire summer or even a full academic year (Yale University<sup>1</sup> and University of Wisconsin<sup>2</sup>) are two good examples. Some institutions also offer short teaching workshops for new faculty, but these programs are the exception and are often optional. Typically professors are not required to have any formal training in the art of teaching. For those of us who have taught classes it quickly becomes apparent that it is neither a negligible task nor an easy skill to acquire or master, yet the importance of good teaching for science, technology, engineering and mathematics (STEM) education can't be overemphasized.

*The task of the modern educator is not to cut down jungles, but to irrigate deserts. — C. S. LEWIS*

In this and previous issues of *Biomaterials Forum* there have been discussions on 1) how STEM education has become one of the most important components of this country's educational programs, 2) the advent of massive open online courses (MOOC), 3) new approaches to traditional lecturing through active learning and assessment. The growing prevalence of these topics in academia stems directly from need. This country is underprepared for the imminent demand of a STEM-educated workforce. MOOCs have emerged as one approach to ameliorate this deficit by making STEM education more accessible for more people, and novel teaching approaches are emerging as a strategy to retain students enrolled in STEM fields and improve their grasp of the topics.

This final point falls to the university and those who teach. While equally important as conducting research, balancing teaching with the overwhelming time and effort demands that come with building and maintaining a research program can be challenging. To address this some universities have hired faculty who exclusively teach and, while a step in the right direction, it is just one step. We are still left with the challenge of excelling in research while being effective educators in the classroom with limited opportunities to acquire and enhance the tools to do the latter.

Studies have shown that factors, such as enhanced learning environments and active learning assessment, increase student performance in STEM fields.<sup>3</sup> It is easy to see how increased performance could lead to better student recruitment and retention, but incorporating active learning and assessment into a course is demanding in time and effort. Lecture prep time may double for some active learning and assessment strategies, making it difficult to reconcile these ideas with the current and growing demands of grant writing and department administrative responsibilities, especially considering the often disproportionate emphasis on teaching in the overall assessment of one's progressing toward career advancement.

Perhaps there is a middle ground. New faculty may be required to attend a brief course on teaching that examines using modern technology in the classroom, new teaching strategies, effective communication and the like. I say required because making these types of workshops optional puts them at the end of a long list of mandatory tasks, but making them compulsory would give everyone the opportunity to acquire the same base level of knowledge. In my own experience, the brief time I spent in teaching workshops has been extremely valuable. Whether my teaching improved as a result is for others to say, but I can say it became a more enjoyable experience with the little knowledge I've gained.

Does your institution provide or mandate teaching workshops for young faculty? Have you taken part in an extended teaching workshop as a graduate student or postdoctoral fellow in preparation for a career in academia? **If so, please share your experiences with the biomaterials community.**

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BY JORDON GILMORE, NATIONAL STUDENT CHAPTER PRESIDENT, CLEMSON UNIVERSITY



There are many exciting initiatives and goals focused on the student members of the Society For Biomaterials (SFB) in the upcoming year. This year's SFB Council Meeting focused on students in several specific and impactful ways. Council members came together to discuss

student opportunities in professional development, increased student memberships and increasing the value of the SFB membership for students. We are looking forward to getting started and implementing some of the ideas drafted at this meeting and the council is certainly looking for the help of students in implementation and evaluation of our student-targeted programs within the Society.

How many of you think of the SFB as a strong professional development tool and a source of mentorship? If you answered yes to this question, then you are right where we would like all student members of SFB to be. Going forward, don't just think of SFB as the society where you can present your work and attend a The Bash at the Annual Meeting. Instead, think of all of the resources that are at your fingertips with SFB. There are many professors, government scientists, regulation experts and industry professionals involved in the Society. The Annual Meeting is not just a way for you to display your work, but also the perfect time to display yourself and explore networking opportunities with so many professionals willing to help. To make this transition smoother, a career fair will be hosted at the

"We want to know about your work as well. If you have any research recognized, published or presented that you are particularly proud of and wish to share with the Society, please let me know. The Student Chapter officers are currently working on a process to recognize student research every month via the SFB website. We hope to include a 'Student Member of the Month' on the website soon."

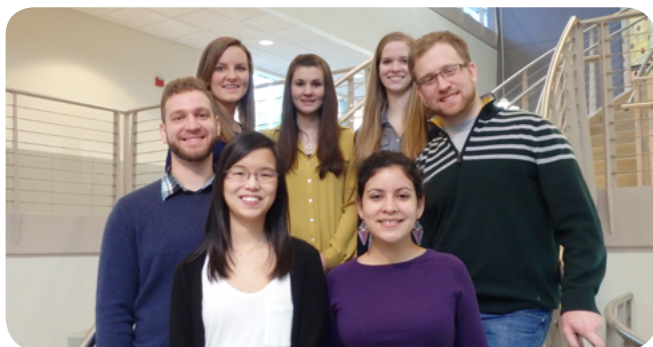
Annual Meeting in Charlotte, North Carolina, this year. The career fair will provide help to students looking to get ahead professionally by including resume/CV review sessions, a student mentoring luncheon and mock interviews. So please spread the word on your campus and come to the Annual Meeting prepared to network. SFB is more than just a scientific community, it is a networking society!

Besides reading awesome articles like this one in the *Biomaterials Forum*, there are so many other benefits to becoming a student member of SFB. That is why the council is really focusing on increasing the number of student memberships within the Society this year. Our Society has a heavy student component already, but we are looking for even more student participation. Why? Because the time spent as a student is often the earliest (and most impactful) exposure to a professional society such as SFB. Simply put, the more you get involved now, the easier it will be for you to stay involved later in your career.

To increase student memberships and to improve your overall experience with SFB we need to know what is important to you as a student member of the Society. The council has decided to construct a student survey focused on increasing the value of the SFB student membership. Professional development is a great reason to join and remain active in SFB, but what other things would you like to see? Well, you have the opportunity to voice your opinion either to me (Student Chapter President) or through the short survey that will be sent to your student chapter leadership. Please think of ways that SFB can be more beneficial for students across a diverse set of educational backgrounds, experiences and professional goals.

One of the continuing goals of the council, and SFB as a whole, is the recognition of student research accomplishments. Several students' works have been highlighted as outstanding and will be recognized at this year's Annual Meeting. There are many exciting things going on within SFB, especially for students. Please stay tuned for the Student Membership Value survey and help us shape how SFB can be made better for students.

BY OLIVIA BURNSED, BIOMATERIALS DAY CHAIR, GRADUATE RESEARCH ASSISTANT, GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, GA



**Figure 1.** The Executive Board for the Student Chapter of the Society For Biomaterials at Georgia Tech. Top to bottom and left to right, Olivia Burnsed (Biomaterials Day Chair), Candice Hovell, Betsy Campbell (Club President), Michael Tanes, Travis Meyer (Biomaterials Day Co-Chair), Cheryl Lau and Giuliana Salazar-Noratto.



**Figure 2.** From left to right, Dr. Robert Latour (Clemson), one of the faculty judges for the student poster competition, with plenary speakers Dr. Kevin Healy (UC Berkeley) and Dr. Pat Stayton (University of Washington).



**Figure 3.** From left to right: Drs. McDevitt, Bellamkonda and Garcia all gave faculty talks after winning graduate student polls.



**Figure 4.** Ravi Bellamkonda, PhD, Wallace H. Coulter Professor and Chair of the Department of Biomedical Engineering at Georgia Tech and Emory, was honored at the Biomaterials Day Reception for receiving the 2014 Clemson Award for Applied Research from the Society For Biomaterials.

Georgia Tech (GT) hosted its first ever Biomaterials Day on Oct. 10, 2014. The all-day conference — titled Next Generation Biomaterials, an appropriate name since it was the next generation of biomaterials scientists — was organized by GT graduate students. Initially, seven first- and second-year graduate students banded together to form the Society For Biomaterials (SFB) student chapter executive board and began planning the event through the national SFB grant proposal in Fall 2013 (Figure 1). Their efforts led to a sold-out event with over 145 attendees from GT and nine other universities including Emory, University of Louisville, Auburn, Mercer, Duke, University of Memphis, University of Florida, Morehouse College and an especially large showing from Clemson's own SFB chapter — It was a raging success. The two plenary speakers for the event were Dr. Pat Stayton from the University of Washington and Dr. Kevin Healy from the University of California-Berkeley (Figure 2), while faculty speakers included Dr. Ravi Bellamkonda, Dr. Andres Garcia and Dr. Todd McDevitt from GT (Figure 3) and Dr. Karen Burg from Clemson. An industry talk on commercialization of biomaterials was also given by Dr. Sean Coyer from W.L. Gore. Other industry sponsors included Bose Electroforce, BioSpherix and 3M.

Four trainees gave full presentations, 12 trainees gave rapid-fire talks and over 70 students gave poster presentations that were judged by a panel of GT and Clemson faculty members. First place (and \$100) was awarded to Chris Johnson from GT, second place (and \$75) went to Marian Hettiaratchi from GT, while outstanding poster awards (and \$50) went to Shantanu Pradhan and Petra Kerscher from Auburn University and Amy Clark from GT. The event ended with a reception honoring Dr. Ravi Bellamkonda's winning of the Clemson Award, one of the most prestigious national honors in biomaterials research (Figure 4).

In addition to sharing knowledge of SFB and regional biomaterials research, the event sparked the formation of the SFB chapter at GT with 23 new graduate student members. With a new student chapter of SFB and the experience of having hosted some of the nation's thought leaders in biomaterials, GT has taken another step forward in not only growing the field of research, but the propagation of student leadership. The GT student chapter is excited to host a joint Biomaterials Day in 2015 with Clemson University (hosted at Clemson) with plans to rotate the host university in the future in an effort to grow a Biomaterials Days throughout the southeast.

The event spurred **student involvement**, the **formation of our own SFB executive board and chapter** and a *very* **successful, sold-out inaugural event!**



# Division Director, Division of Materials Research

NATIONAL SCIENCE FOUNDATION (NSF), ARLINGTON, VA

The Directorate for Mathematical and Physical Sciences (MPS) announces a nationwide search to fill the position of Division Director for the Division of Materials Research (DMR). Appointment to this senior executive service position may be on a career basis or on a one- to three-year, limited-term basis, with a salary range of \$158,700 to \$178,000. Alternatively, the incumbent may be assigned under the Intergovernmental Personnel Act (IPA) provisions. Information about the division's activities may be found at [www.nsf.gov/dmr](http://www.nsf.gov/dmr).

The successful candidate will possess an established record of significant achievement in research administration, as well as leadership responsibility in academe, industry or government. In addition to having a strong record of research and education accomplishments within his or her technical communities, the Division

Director must be experienced and competent in technical, financial and administrative management. He/she must work well with people, be an effective communicator and act as a mentor to continuously develop the diversity of talents and skills of his or her colleagues at all levels.

The announcement (DMR-2015-0002) with position requirements and application procedures is located at [www.usajobs.gov/GetJob/ViewDetails/393434800](http://www.usajobs.gov/GetJob/ViewDetails/393434800).

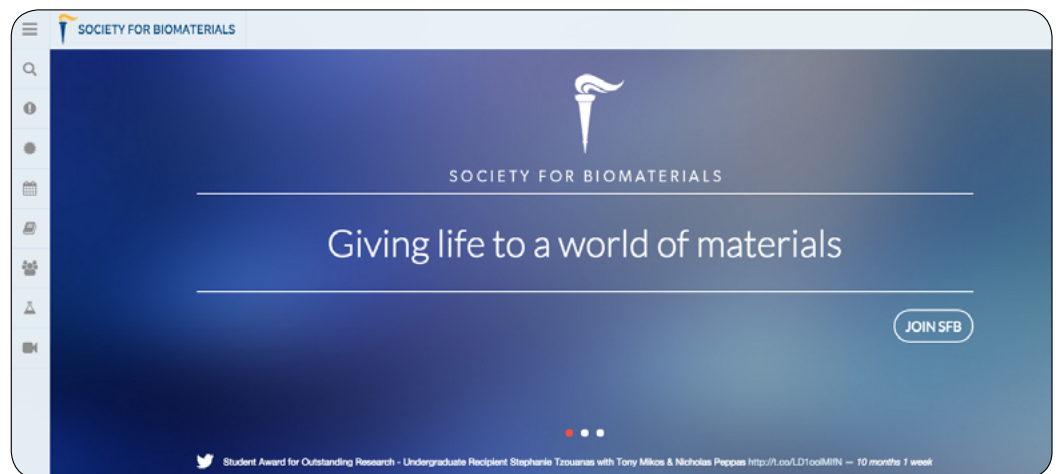
Applicants may also obtain the announcement by contacting the executive personnel staff at 703-292-4345. Hearing impaired individuals may call TDD 703-292-5090. Applications must be received by the closing date.

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## HAVE YOU VISITED OUR NEW WEBSITE?

biomaterials.org

It offers information about industry news, awards, events and the Society's Special Interest Groups (SIGs) and committees, as well as access to publications, educational materials and more. Students can check out the Student Section of the website to learn how they can get involved.





## ASTM INTERNATIONAL HOLDS 2014 FALL MEETING IN NEW ORLEANS

BY CARL G SIMON JR., GOVERNMENT NEWS CONTRIBUTING EDITOR



The American Society for Testing and Materials (ASTM) International held their fall meeting of Committee F04 Division 04 on Tissue Engineered Medical Products in New Orleans, Louisiana, Nov. 11-13, 2014. Many new documents have been published and initiated.

### Hot Off the Press

- F3089 Standard Guide for Characterization and Standardization of Polymerizable Collagen-Based Products and Associated Collagen-Cell Interactions
- F2952 Standard Guide for Determining the Mean Darcy Permeability Coefficient for a Porous Tissue Scaffold
- F2998 Guide for Using Fluorescence Microscopy to Quantify the Spread Area of Fixed Cells
- F3088 Use of a Centrifugation Method to Quantify/ Study Cell-Material Adhesive Interactions

### Standards Under the Development

- Standard Guide for Measuring In Vitro Release of Biomolecules from Matrices
- Standard Guide for Evaluating Biomaterial Decellularization Processes
- Cell Delivery Device (Catheter/Needle) Compatibility with Delivered Cellular Therapies
- Performing Quantitative Fluorescence Intensity Measurements in Cell-Based Assays with Epifluorescence Microscopy
- Using Microcomputed Tomography to Characterize Tissue Scaffold Structure

As reabsorbable metal devices are reaching the market (e.g., magnesium bone screws), a new committee, ASTM AC87 — Standardization Strategy for Absorbable Metals, has formed. Finally, there was a teleconference with mesenchymal stem cell (MSC) experts to discuss the potential need for a Reference MSC for use in developing qualified assays for MSC characterization. All agreed that tighter specifications on MSCs will give a better chance of meeting a clinical endpoint and demonstrating efficacy.

ASTM standards are available from the ASTM website ([astm.org](http://astm.org)). Please contact Carl Simon at 301-975-8574 or [carl.simon@nist.gov](mailto:carl.simon@nist.gov) if you are interested in participating in these important activities.

# Advances in Tissue Engineering

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- Nanobiotechnology



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