

Re-Engineering Engineering Education

BIOMATERIALS FORUM



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BIOMATERIALS FORUM



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Departments

The Torch

- 2 From the Editor
- 3 From the President
- 4 Staff Update
- 6 Award Winners
- 7 Officer Nominees

Biomaterials Community

- 2 Community Calendar

Education News

- 10 A New SFB Education Column
- 22 2009 University of Kentucky and Case Western Reserve University Biomaterials Day
- 23 2009 Clemson University Biomaterials Day

University and Research Institution News

- 24 Connecting the Dots

Government News

- 25 AIMBE Update
- 26 Surface Modification Method Affects Laminin Retention and Vascular Smooth Muscle Cell Proliferation under Strain

Book Review

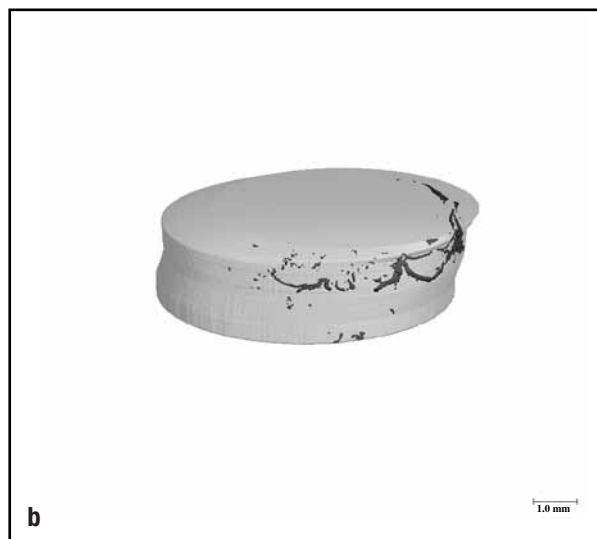
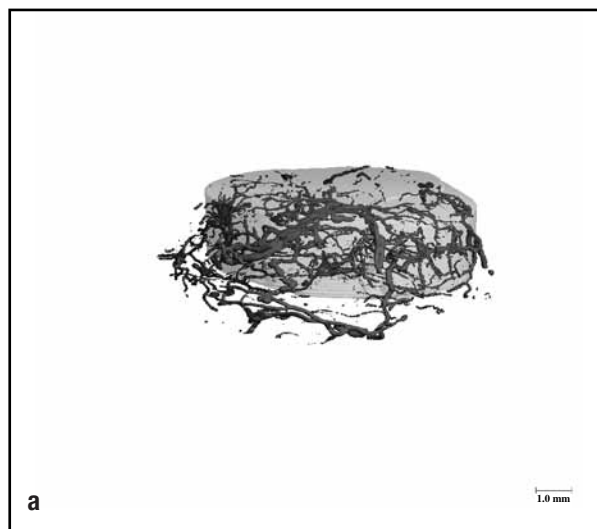
- 27 Why You Should Still Buy Books, or Borrow Them from the Library

Industry News

- 29 BioInk

Chapter News

- 29 Members in the News



On the cover: MicroCT reconstruction of explanted Polyethylene glycol (PEG) based hydrogel containing arginine-glycine-aspartic acid-adhesive sites, matrix metalloproteinase-degradable RGD-adhesive sites, MMP-degradable cross-links, and vascular endothelial growth factor VEGF (a) contrasted against an explanted PEG control (b) (no VEGF). The hydrogel is depicted in gray and the blood vessels in red. Samples were implanted for four weeks in rats. Photograph courtesy of Dr. Andrés J. Garcia, Professor and Faculty Fellow, Woodruff School of Mechanical Engineering, Georgia Institute of Technology.



Once again it is a new year—a time to review the road behind and take stock of opportunities and challenges in order to plan for the path ahead. Accordingly, this issue marks the launch of two new columns reflecting the maturation of the field of biomaterials and providing more dimensions to the *Forum*. First, Dr. Alan

Litsky of The Ohio State University Biomedical Engineering Department has kindly agreed to serve as our American Institute for Medical and Biological Engineering (AIMBE, www.aimbe.org) News editor. AIMBE seeks to promote the field of biomaterials and is our link to governmental issues affecting biomaterials regulation, policy and research. Those of us in research tend to focus on the research and are often annoyed by “distracting” bigger picture agendas. We think our own small segment of the biomaterials world is terribly exciting and find it hard to believe others might not agree. Whether or not we choose to acknowledge the bigger picture view, AIMBE provides a panoramic look at biomedicine and provides a crucial voice for biomaterials research and development. Alan will work to inform all of us about biomaterials issues of interest to you and of focus by AIMBE. Please use the column as the stimulus to become involved in the bigger picture.

Second, Dr. Jan Stegemann of the University of Michigan Department of Biomedical Engineering has kindly agreed to serve as our Education News editor. I daresay we are all

educators in some capacity, whether based at an institute of higher education or not. Education can be exponentially effective if one benefits from interaction and sharing of ideas. My most successful experiences in the classroom stemmed from continually taking courses highlighting education techniques and tools and from discussing ideas with colleagues. My most successful experiences in translating biomaterials information to teenagers stemmed from working with teachers who could quickly identify what would and would not work in a high school classroom. With the reality of today’s information overload, it stands to reason we all need assistance in quickly identifying the most appropriate tools in our own craft. Jan has been an active member and leader in the Biomaterials Education Special Interest group and will be seeking input from all of us in order to highlight various aspects of biomaterials education across a range of topics. Please contribute to this very important column.

I hope you have each taken time to reflect on 2009 and to construct your own master plan and roadmap for 2010. I wish for all of you a very Happy 2010!

Best wishes from Clemson,

*Karen J.L. Burg
Hunter Endowed Chair and Professor of Bioengineering
Interim Vice Provost for Research and Innovation
Clemson University*

Community Calendar

SFB 2010 Annual Meeting and Exposition

Seattle, WA
April 21–24, 2010
www.biomaterials.org

36th Annual National Society for Histotechnology Convention/Symposium

Seattle, WA
September 24–29, 2010
www.hsh.org





Creating opportunities for professional development is a primary goal for the Society For Biomaterials. We have had a tendency to think of professional development as being relevant only to students, but it also includes recent graduates, post-docs, individuals switching careers, as well as those looking for career advancement. Professional development

encompasses opportunities for education, leadership, awards and recognitions and networking.

Education

Attendance at the annual meeting is synonymous with keeping abreast of the new scientific and technical developments in the field of biomaterials. State-of-the-art research is presented throughout our meeting within a combination of symposia, general and poster sessions. Numerous educational opportunities exist, including workshops, tutorials, panel discussions and presentations from invited speakers (plenary sessions, symposia speakers). The Q&A and discussions are also educational experiences, providing further insights into experimental design, best techniques to use and interpretation of results. Exposure to surgical techniques and translational research can be gained through viewing our video library. The Society's journals and the *Biomaterials Science* textbook are also invaluable resources. The new book series will augment our commitment to educational materials.

Leadership

The Society For Biomaterials offers many opportunities for leadership development and experience. All members are encouraged to participate in the meeting planning process. Members may submit ideas for general sessions, panel discussions, tutorials, workshops and symposia. In fact, our society's vitality depends on people leading the effort to bring the best science to the community by taking their ideas and leading the effort to organize them. Members may also participate as abstract reviewers or session moderators. Additionally, leadership opportunities exist within our Special Interest Groups, Committees, Task Force Groups and elected Board positions. Members are strongly encouraged to volunteer for these positions.

Awards and Recognitions

Professional development can also be influenced by the awards and recognitions one receives. The SFB appreciates this point and offers awards and recognitions for individuals ranging from undergraduate students to world-renowned experts in the field. These awards include the SFB awards (Founder's; Technology Innovation and Development, Young Investigator, Student Awards for Outstanding Research and Award for Outstanding Research by a Hospital Intern, Resident or Clinical Fellow), the Clemson Awards (Applied Research, Basic Research, Contributions to the Literature), the Star Awards (for students) and the Hall Scholarship. Outstanding members are recognized for their contribution to the field of Biomaterials by their selection as fellows to the International College of Fellows of Biomaterials Science and

Engineering as well as the American Institute for Medical and Biological Engineering.

Networking

The new tagline for the Society For Biomaterials is "Where Materials meet Biology." This can be expanded to say "Where Materials Scientists meet Biologists" or "Where Academia meets Industry and Regulatory" or "Where Researchers meet Clinicians." I could keep going, but you get the point. The SFB is a place where people meet. At a recent meeting, I asked a small group of SFB members why they became members of the SFB. After a few minutes of discussion, the underlying theme was clear—the annual meeting is a meeting where you meet your friends, colleagues and others in your field to enjoy the science and the fraternizing. We've come to call this networking, but it is so much more.

What opportunities are there to network as a member of the SFB? How can we maximize these opportunities? One frequently made comment is our members are approachable. There are many opportunities to interact with other meeting attendees including guest speakers, members of Council and members of the Board. There are social gatherings such as the opening reception, the Biomaterials Bash and the SIG Mixer. There are the Poster Session and informal gatherings during breaks in the Poster/Exhibit Hall where people gather to share a coffee or walk around the booths and posters. Special Interest Groups (SIGs) were formed with networking in mind. There are 13 SIGs addressing issues facing researchers, industry members, clinicians, educators and those involved in regulatory. New SIGs can be formed if one does not exist in your area of research. This is a great opportunity to meet others in your specific field, share ideas and develop relationships.

Maximizing the opportunities

It is important that our members and our leadership understand the Society For Biomaterials can play an important role in our professional development. We are exploring new programs to enhance this experience. A task force has been formed as part of the Education and Professional Development Committee to develop a mentorship program, which will bring together our more established members in the various fields of academia, industry and government with the younger members. A luncheon will be held at the annual meeting in Seattle, Wash., directed towards the students and will enable them to ask leaders in the field about their experiences.

Please utilize the SFB as a resource in your professional development. As a member, you have access to our membership list. Don't be afraid to call or e-mail other members.

Incorporate yourself into the culture of the Society.

We need to be diligent in our efforts as a Society to promote our greatest asset—our members!

Lynne Jones

Hello from the Society For Biomaterials headquarters! By providing a regular update of staff and membership activities, it is our sincere wish that all the Society's members stay abreast of current Society activities, and we encourage more members to take an active role in the Society For Biomaterials! This quarter, headquarters staff has been active in their support of the following committee activities:

The Awards, Ceremonies and Nominations Committee

evaluated several nominations for officers and awards and presented their recommendations to Council. Officer candidates are listed on page 7. The Committee believes the officer nominations represent a strong slate for its membership and re-enforce excellence in leadership and in SFB.

2010 Award recipients are listed on page 6. While there were no nominations for the Hospital Intern, Resident or Clinical Fellow Award or the Technology Innovation and Development Award this year, there were many, many nominations for the other awards and the committee had many difficult choices. SFB has a deep pool of excellent individuals worthy of recognition in future years.

Council ratified all recommendations of the Committee. The Committee would like to thank those who took the time to nominate their colleagues and sincerely appreciates the officer candidates' willingness to serve the Society For Biomaterials.

The Bylaws Committee is working on a revision to Article IX on the Special Interest Groups. A proposal is expected for membership approval at the 2010 Annual Meeting.

The Devices and Materials Committee continues work on three of their four objectives:

- Establishing an industry advisory board to assist with setting programs to meet the needs for corporate professional and leadership development.
- Creating an exhibitor/sponsor consultative group to provide input on meeting exhibits and similar venues.
- Providing input to the Liaison Committee on representatives to standards organizations such as ASTM and ISO.

The fourth objective, to develop a program for the Annual Meeting to provide clinical relevance to biomaterials product development, will be realized with a panel discussion of surgeons in Seattle entitled "Overcoming Obstacles to Innovation."

The Education and Professional Development Committee

continues to evaluate endorsement requests and oversee the implementation of the Biomaterials Day grant program with events at Texas A&M, Columbia University and Johns Hopkins/Penn State/University of Maryland. The Committee is developing a mentorship program and has also worked with the National Student Chapter to identify three outstanding Chapters for awards in 2010: The University of Memphis, Columbia University and the University of Florida.

By providing a regular update of staff and membership activities, it is our sincere wish that all the Society's members stay abreast of current Society activities, and we encourage more members to take an active role in the Society For Biomaterials!

The Finance Committee: Laura J. Suggs, University of Texas at Austin (Chair)

The finance committee has spent the past three months working closely with the Board and Council in order to approve the 2010 budget. The budget details were particularly challenging this year. The final projection was a balance between a conservative position based on last year's meeting with an optimistic position based on the overwhelming increase in abstract submissions for the upcoming 2010 meeting. Other activities of the committee include the approval of a very modest reentry into equities as well as the establishment of dedicated funds for the C. William Hall award.

The Liaison Committee continues to interact and discuss possible joint meetings with other organizations including WBC 2012, ORS, MRS, BMES and ASTM.

The Long Range Planning (LRP) Committee has focused in its latest meeting on elements of the Society that are primary factors for the members. This included envisioning ideas related to the off-year (World Congress year) meeting style and format and other ideas related to shared meeting venues with other societies and concepts related to best practices in presenting the most important science and innovations at meetings. The LRP committee is working to plan and carry out activities to preserve the important and unique aspects of the Society while seeking to innovate in our interactions to attract the most relevant and the highest quality scientists and engineers to our community. Please send us your thoughts!

The Meetings Committee is developing recommendations for increasing sources of revenue to better offset meeting attendee registration costs. The Committee will also evaluate future meeting locations in the near future. This committee is also discussing how best to optimize the meeting structure to maximize opportunities for presentations and for networking. Lynne Jones is also soliciting suggestions for a community

based service project in Seattle during the 2010 Annual Meeting. Please forward any information on worthwhile local organizations or events to Lynne Jones (ljones3@jhmi.edu) for consideration.

The Membership Committee: Nicholas Ziats, Case Western Reserve University (Chair) The Membership Committee met by phone conference in August and December to discuss a number of issues including our budget and ideas for recruiting new members to the Society. Letters are being sent to all authors contributing to the Journal of Biomedical Materials Research as well as to Biomedical Engineering department chairs throughout the United States. New student chapters have been formed at Case Western Reserve University, Purdue University, University of Washington and the University of Kentucky. Other chapters potentially being formed include a chapter at Texas A&M as well as Duke University. Society brochures were handed out at two Biomaterials Days initiated last year at Clemson University in July and at a joint University of Kentucky/Case Western Reserve University Biomaterial Day in September. Due to the extraordinary number of abstracts submitted for the SFB meeting in Seattle, Wash., it is hoped we will be able to recruit more members this year; see you in Seattle!

The Program Committee has spent considerable time in the planning and organization of the 2010 Annual Meeting. The program for the 2010 Annual Meeting of the Society For Biomaterials in Seattle is nearly complete. A record 1055 abstracts were received, representing a 45 percent increase beyond the number of abstracts submitted to the 2009 Annual Meeting. This attests to the high level of interest in biomaterials research within the academic, industrial and government communities. Although the unusually high demand for oral and poster presentations posed a significant challenge for the Program Committee, we are confident the outcome of the process will be an exciting and successful 2010 Annual Meeting. In addition to oral, rapid fire and poster sessions, plans have been made for several Workshops, Tutorials, Panel Discussions and Symposia on specific biomaterials topics. Highlights of the meeting include a keynote lecture in the opening session on Wednesday evening, Plenary Sessions with winner presentations and a "Grand Challenges for Biomaterials Science and Engineering" panel featuring esteemed biomaterials researchers discussing a range of critical issues facing our field. The Program Committee looks forward to seeing you in Seattle!

The Publications Committee has made recommendations for revisions to the editorial processes within each journal and is working to develop strategies to reduce the backlog of

articles in the Journal of Biomedical Materials Research Part A pipeline. The Committee is also pleased to announce that Drs. Nicholas Peppas and Jeffrey Hubbell have agreed to serve as co editors for a forthcoming book series.

Representatives from the Special Interest Group Chairs Committee are working with the Bylaws Committee to address issues specifically related to Article IX concerning the Special Interests Groups. Once again, the Special Interest Groups were active in proposing and organizing a multitude of sessions, symposia, workshops and tutorials for the 2010 meeting. Finally, the SIGs have been working to upgrade their Web presence through creation of individual SIG pages. Most recently, the Tissue Engineering SIG and Proteins and Cells at Interfaces SIG have developed new web pages.

If you are interested in knowing more about a particular issue, policy or committee activity, or if you have any suggestions for improved membership services, please contact me directly at the SFB headquarters office.

Sincerely,



Dan Lemyre, CAE
Executive Director
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Founders Award

Stuart Cooper, PhD - Ohio State University

Awardee Address: *Polyurethanes at Biointerfaces*
Saturday, April 24, 2010

Plenary Session II • Washington State
Convention Center – Main Ballroom – 6E
11:00 AM– 11:20 AM



C. William Hall Award

**Nicholas Peppas, ScD – The University
of Texas at Austin**

Awardee Address: *Biomaterials in the Service of
World Health and the Improvement of our Patients’
Quality of Life*

Thursday, April 22, 2010
Plenary Session I • Washington State
Convention Center – Main Ballroom – 6E
11:00 AM– 11:20 AM



Clemson Award for Basic Research

William Reichert, PhD – Duke University

Awardee Address: *Functionally Accurate In Vitro
Assays for Biomaterials*

Thursday, April 22, 2010
Plenary Session I • Washington State
Convention Center – Main Ballroom – 6E
11:25 AM– 11:45 AM



Clemson Award for

Applied Research

Michael Yaszemski, MD, PhD -

Mayo Clinic College of Medicine

Awardee Address: *The Translation of Tissue
Engineering Strategies to Clinical Practice*

Saturday, April 24, 2010
Plenary Session II • Washington State
Convention Center – Main Ballroom – 6E
10:35 AM– 10:55 AM



Clemson Award for Contributions to the Literature

Gordana Vunjak-Novakovic, PhD -

Columbia University

Awardee Address: *Engineering Human Tissues*
Thursday, April 22, 2010

Plenary Session I • Washington State
Convention Center – Main Ballroom – 6E
10:35 AM– 10:55 AM



Young Investigator Award

**Todd McDevitt, PhD – Georgia
Institute of Technology**

Awardee Address: *Biomaterials For & From Stem
Cells - New Approaches to Regenerative Medicine*
Saturday, April 24, 2010

Plenary Session II • Washington State
Convention Center – Main Ballroom – 6E
11:25 AM– 11:45 AM



Student Award for Outstanding Research –PhD Candidate

**Pamela Knight - Case Western
Reserve University**

Awardee Address: *In vivo kinetic degradation
analysis and biocompatibility of aliphatic polyester
polyurethanes*

Saturday, April 24, 2010
Concurrent Session VIII: Symposium
“Cardiovascular Materials and Polyurethane
Biomaterials” • Washington State Convention
Center – Room 615-617 • 4:15 PM– 4:30 PM



Student Award for Outstanding Research –Masters Degree Candidate

**Elaine Lee - Case Western
Reserve University**

Awardee Address: *Cell Culture Platform with
Mechanical Conditioning and Non-damaging
Cellular Detachment*

Saturday, April 24, 2010
Concurrent Session VII: General Session
“Stimuli-responsive Scaffolds for Tissue
Engineering: New Developments” •
Washington State Convention Center – Room
608-609 • 9:00 AM– 9:15 AM



Student Award for Outstanding Research – Undergraduate

Rebecca Scott - Saint Louis University

Awardee Address: *Characterization of
Poly(Ethylene Glycol) Gels with Added Collagen
for Neural Tissue Engineering*

Friday, April 23, 2010
Concurrent Session VI: General Session
“Biomaterials for Soft Tissue Engineering”
Washington State Convention Center – Room
611-612 • 3:45 PM– 4:00 PM

2010 Officer Nominees

The task of selecting the slate of Officer Nominees for 2010 has been completed. Following are the nominees for President-Elect and Member-at-Large.

Following are brief descriptions of the responsibilities of each position, along with descriptions of the nominees' biographical background and their vision for the Society's future.

President-Elect

The President-Elect shall become familiar with the duties of the President and 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 one year without succession. The President-Elect is the chairperson of the Long-Range Planning Committee.

Nominees for President-Elect



Karen Burg, PhD

Hunter Endowed Chair and Professor of Bioengineering

*Interim Vice Provost for Research and Innovation
Clemson University*

A graduate of North Carolina State University (B.S., Chemical Engineering) and Clemson University (M.S., Ph.D.,

Bioengineering), Karen completed a tissue engineering postdoctoral fellowship, working for the Chief of Surgical Oncology at Carolinas Medical Center in Charlotte, N.C., before joining the faculty at Clemson University in 1999. In 2006 and 2007, Karen completed an American Council of Education fellowship at the University of Maryland Baltimore County and the Georgia Institute of Technology and was subsequently appointed Interim Vice Provost at Clemson University. Karen has given more than 200 invited presentations on the subject of engineered tissues, including multiple invited presentations at Gordon Research Conferences and National Academies meetings. She is the inventor of record on four patents and nine patent applications; technologies from her laboratory served as the basis for one spin-off company. Karen has authored more than 80 peer-reviewed publications pertaining to injectable tissue engineered systems; she is the Executive Editor of *Biomaterials Forum*, the Editor-in-Chief of the *Journal of Histotechnology* and the co-editor of a monograph series entitled "Advances in Polymeric Biomaterials." Honors to Karen include a Presidential Early Career Award for Scientists and Engineers, awarded by the President of the United States, the inaugural AO Research Prize, awarded by the AO Foundation in Switzerland, recognition as a Massachusetts Institute of Technology's TR100 Young Innovator, an American Institute for Medical and Biological Engineering Fellow, an American Council on Education Fellow and a United States Department of Defense Era of Hope Scholar. Karen has served on four Society For Biomaterial (SFB) Annual Meeting program committees, including serving as the program chair for the 2009 Annual

Meeting of the SFB; she has also served as a member of the SFB Council and the publications committee for five years. Karen is a member of the North America Council of the Tissue Engineering and Regenerative Medicine International Society and served on the Technical Program Committee for the 2008 Department of Defense (DoD) Era of Hope breast cancer meeting. She has served on seven United States National Science Foundation (NSF) biomaterials-focused Engineering Research Center site visit teams and has served as reviewer for multiple national and international funding organizations, including the US NSF, the Swiss AO Foundation, the Swiss NSF, the National Institutes of Health and the DoD. Karen serves as the founding director of the Clemson University Institute for Biological Interfaces of Engineering (IBIOE), a research institute dedicated to the development of bench-top engineered tissue systems for drug discovery and study of disease processes. In this capacity she has worked to gain IBIOE designation as a state approved Center of Economic Excellence (June 2009) and to secure \$6 million to establish an IBIOE endowed chair in tissue systems characterization.

Vision Statement: My vision is for the Society For Biomaterials (SFB) to continue to be the recognized leadership organization in biomaterials research. There are evolving challenges with the advent of new societies and technologies changing the face of the landscape, and I will work diligently to assist in securing the SFB short- and long-term future. First, I will work with you to establish a strategic biomaterials roadmap to establish SFB as the "go to" resource for federal funding agencies and industries as agency program directors and leaders look to predict the future directions in biomaterials research. Accordingly, we will need to outline a methodology for capturing roadmap information and for updating that information regularly. A meaningful roadmap will require input from industry, academe and from the clinic. As President, my goal will be to work with federal agencies and organizations to provide partnerships that promote SFB interests and enlist SFB member leadership and technical input; i.e. to ensure that the roadmap is a valued resource to the research community at large as well as the guiding document for the SFB membership and leadership.

Also, we must increase visibility of the annual meeting and the Society through enhanced connections to the private and academic sectors. Working to index our meeting abstracts will ensure higher electronic access to the Society by the research and development sectors globally. Working to involve more commercial partners in our meeting will allow us to expand our services during the meeting and attract more meeting attendees. Electronic social networking is playing an increased role in marketing, fund-raising and research, both in public and private sectors; I will construct a working group to tap into this valuable resource and to strategize as to how we might better harness networking tools.

The future of the SFB is dependent on our ability to train and mentor our future leaders. I was first introduced to the SFB as a student, and so I feel very strongly about student membership and active involvement in the Society. To this end, I will work with the Education and Professional Development committee

2010 Officer Nominees

Continued from previous page.

to encourage the development of student- and postdoctoral fellow-centric workshops and opportunities and to better integrate undergraduate research into the annual meeting.

In summary, I look forward to continuing to serve the SFB in a leadership role, and I am truly honored to be considered as a candidate for President-Elect.



Tim Topoleski, PhD

*Professor, Graduate Program Director
University of Maryland Baltimore County*

L.D. Timmie (Tim) Topoleski is a Professor and Graduate Program Director in the Mechanical Engineering Department at UMBC (the University of Maryland, Baltimore County). He joined the faculty of UMBC in the Fall of 1990 after completing his Ph.D. in Bioengineering at the University of Pennsylvania. He also holds undergraduate and graduate degrees from Cornell University. His research interests are in the mechanics of materials for both manufactured implant materials and biological materials. He has published more than 100 papers in journals, books chapters and proceedings. He received a Coventry Award for Basic Science from the Knee Society, has been awarded both the Outstanding Teaching and Outstanding Research awards from UMBC's College of Engineering and Information Technology and has been named a UMBC Humanities Teaching Fellow. Tim has been an active member of the Society For Biomaterials since he was a graduate student and has served the Society as the Society's Member-at-Large in 2007-2008, Chair of the Bylaws Committee and Parliamentarian (2002-2007), Chair of the Orthopaedic Biomaterials Special Interest Group (1999-2000), Orthopaedic Biomaterials Organizer and Session Chair for the 6th World Biomaterials Congress (2000) and as a perennial Session Chair at the Annual Meetings of the Society For Biomaterials. He is a reviewer for numerous scientific journals as well as the National Science Foundation, the National Institutes of Health and the Arthritis Foundation, and he is a consulting scientist to the U.S. Food and Drug Administration. Currently, he is the President of the UMBC Faculty Senate, and he was recently chosen as the UMBC Presidential Teaching Professor for 2008-2011.

Vision Statement: The Society For Biomaterials is a worldwide leader in promoting education and research in biomaterials science. The members of the Society want to maintain that leadership and increase the activities and visibility of the Society as biomaterials research and applications continue to evolve. I have enjoyed working with the Society members, the Board of Directors and Council as the Chair of the Bylaws Committee and Member-at-Large, and I would like to continue to represent the expectations of the Society members to the Board and Council. I am especially interested in continuing the growth of the educational mission of the Society For Biomaterials in both formal scientific training and professional

development. I appreciate the nomination for the position of President, and I know that the responsibilities of the office include representing the entire membership of the Society. If I have the privilege to be elected as the next President, I will work to maintain transparency in the Society's financial matters, help to standardize procedures and be a direct representative of the membership's voice to the Board and Council. I will use my experience and understanding of the Society's operations to work with the Society's membership to increase the benefits of membership by the continued responsible use of our resources and to seek out potential new and innovative sources of support and revenue.

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 Council. The Member-at-Large shall serve for a period of one year.

Nominees for Member-at-Large



Warren O. Haggard, PhD

*Professor, Herff Chair of Excellence
The University of Memphis*

Warren is a Professor in the Joint Graduate Program in Biomedical Engineering at The University of Memphis and The University of Tennessee and is a Chair of Excellence in the Herff College of Engineering at The University of Memphis. He has been a member of the Society For Biomaterials since 1987. Research areas for Warren include applied tissue engineering and biomaterials research, particularly in the musculoskeletal applications of healing of bone defects, infections, functional repair of ligaments, tendons and spinal disc, and local delivery of biological agents with resorptive scaffolds. Warren has been at The University of Memphis since May 2004, and his teaching includes courses in Biomaterials and the Senior Project (Capstone) course for the undergraduate biomedical engineering students.

Warren earned a Bachelor of Science degree in Chemistry from Auburn University in 1978 and Master of Engineering and Doctorate degrees in Biomedical Engineering from The University of Alabama at Birmingham in 1981 and 1994, respectively. Following his Master's degree, Warren worked for three years at Union Carbide on lithium battery development and for six years at Dow Corning Wright on medical device development. Upon completion of his Doctorate degree, he worked for 11 years at Wright Medical Technology in the Research and Development group as a manager, director and vice-president on multiple orthopaedic implants and biomaterials.

Warren serves as the Vice-Chairperson of the American Society for Testing and Materials (ASTM), Tissue Engineered Products standards committee and is a member of the American Academy of Orthopaedic Surgeons Orthopaedic Device Forum

committee. He is a fellow of the American Institute for Medical and Biological Engineering and is the recipient of the Leroy Wyman and Patrick G. Laing Awards from ASTM F04 committee – Medical Devices and Materials. Warren is also a member of the Orthopaedic Research Society Nominating Committee and a member of Society For Biomaterials, Devices and Materials Committee. He is a reviewer for multiple journals and granting agencies. He is a director for the ASTM board of directors and on the board of directors for a small medical company, Extremity Innovation.

Vision Statement: A Society is only as impactful as the Society's members are engaged. This Member-at-Large position is the membership's voice and influence for the current and future plans of the Society, and I would be honored if given the opportunity to serve the Society For Biomaterials in the Member-At-Large position.

For an impactful Society, the members should 1) find value in the membership, 2) search and gain beneficial technical content and strong interactions, 3) educate our future leadership and 4) provide leadership in the biomaterial field. With our Society's tools, namely journals, Special Interest Groups (SIGs), active student chapters, annual meetings and newsletters, we are addressing some of the membership's needs in these changing and challenging research and business environments. Improvements and enhancements are always components of an active and growing organization. My approach in the Member-At-Large position would be to pursue and encourage enhanced engagement of the Society's leadership and membership to work toward maximizing our collaborative scientific and technical efforts for the advancement of the field of Biomaterials. Advancements in Biomaterials have been and continue to be fundamental to the progress of health care, health care delivery and costs. An impactful Society For Biomaterials can be an active component in the improvement of the quality of life in the United States and throughout the world.



David Puleo, PhD

Professor and Director
Center for Biomedical Engineering
University of Kentucky

Dave is a Professor at the University of Kentucky, where he is also Director of the Center for Biomedical Engineering. He also holds an appointment in the Center for

Oral Health Research in the College of Dentistry. Dave received B.S. and Ph.D. degrees in Biomedical Engineering from Rensselaer Polytechnic Institute, the latter under the direction of Professor Rena Bizios. In 1991, he joined the University of Kentucky as a junior faculty member to establish a research and teaching track in biomaterials. His research interests focus on developing biomaterials and surface modification strategies to control cellular responses at the tissue-implant interface based on understanding of physiological and pathophysiological processes.

Dave has participated in the Society For Biomaterials since he was a graduate student nearly 20 years ago. He served the Proteins and Cells at Interfaces Special Interest Group as Program Chair (1997-1998, 1999-2001), Vice-Chair (1998-1999) and Chair (1999-2001). He also served as University News Contributing Editor for the Biomaterials Forum (2001-2006) and on the Education and Professional Development Committee (2000-2003) and Awards, Ceremonies, and Nominating Committee (2001-2002). In addition, he has been a Symposium Organizer or Topic Coordinator for several annual meetings. Recently, he co-organized a Biomaterials Day in Lexington, Ky.

Dave is an Associate Editor for the *Journal of Biomedical Materials Research Part B (Applied Biomaterials)* and serves on the editorial board of *Journal of Biomedical Materials Research Part A*. He reviews for numerous biomaterials-related journals and has served on and chaired several review panels focused on biomaterials and tissue engineering at the National Institutes of Health and the National Science Foundation. Dave received a Research Initiation Award from the National Science Foundation, and he was awarded the Bourses de stage de recherche scientifique of the Programme québécois de bourses d'excellence administered through the Ministère de l'Éducation of the Gouvernement du Québec. He co-authored *Introduction to Tissue-Biomaterial Interactions*, a textbook written specifically for undergraduates and first-semester graduate students transitioning into the field of biomaterials and recently co-edited a book focused on protein, cell and tissue interactions with biomaterials surfaces. Dave is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE).

Vision Statement: The Society For Biomaterials has been my primary professional society since I was a graduate student. Although I participate in other societies and attend their conferences, the SFB annual meeting and Special Interest Group (SIG) activities provided me with innumerable professional and personal relationships that have played a significant role in my career development. As such, I am highly motivated to ensure it remains a strong and vibrant organization that represents the interests of its student (faculty and student), private sector, and governmental constituencies.

With many society membership rolls shrinking as a result of expired memberships following the recent economic downturn, it is critical for the Board and Council to understand the needs of the Society's members. Although it is a bit clichéd, the Society is the people, not the bylaws and organizational structure. Member benefits, annual meeting programming, SIG activities and student affairs are just a few of the important topics discussed at the "grass roots" level. Because the greater good and long-term stability of the Society are essential, not all suggestions can be implemented, but the members' voices must be heard. If given the privilege of serving as unencumbered Member-at-Large, I pledge accessibility, understanding and openness as your representative.

A New SFB Education Column

Education News

by Jan P. Stegemann,
Education News Contributing Editor

This column is a new feature of the Biomaterials Forum. In each issue we will present news or information related to biomaterials education. This is, of course, quite a broad topic, and our main goal is to highlight some of the educational ideas and achievements of our members. Our community is full of scientists, engineers, clinicians and educators who have had an impact on how biomaterials is taught and practiced. We will all benefit from hearing of the experiences of others.

Therefore, let me start this effort with an invitation to all SFB members to contribute to this column. Most of us are involved in education in some way, even if we don't work at an academic institution. Perhaps you have developed a particularly effective teaching technique or tool to enhance student learning. Maybe you have helped put together a course, curriculum or training seminar to teach a particular group about biomaterials science. Or maybe you have been involved in other educational efforts as part of the Society or its meetings. If this is the case, I invite you to share your experience with others through this column.

As you know, the Society has a Biomaterials Education Special Interest Group (SIG) active in enhancing educational opportunities for members and in promoting innovative ideas to improve biomaterials education broadly. In fact, many of the SIGs sponsor educational initiatives, either in conjunction with the Annual Meeting or separately. This column also will highlight those efforts and hopefully will serve to promote these educational activities. Our members clearly possess a vast wealth of expertise in teaching biomaterials science. It would be great to capitalize on that wealth to improve biomaterials education more broadly.

Below I have listed a few topics that may be of interest to SFB members. In all cases, they are questions I have thought about myself, but certainly have not answered fully. This list is only a small sample of the types of topics we can address in this column. I invite you to send me your thoughts on these issues as well as any other questions you would like to see discussed.

Topics:

- How much bio, how much materials? What is the correct balance for biomaterials courses?
- What techniques/tools have worked best in your classes?
- What kinds of assessment work best in biomaterials courses?
- How can a department manage overlap between biomaterials and other courses in its curriculum?
- Beyond biomaterials courses: what are the other core educational components of a biomaterials scientists' education?
- What constitutes a "concentration in biomaterials" within a curriculum?
- What are the needs of industry in terms of biomaterials education, both in terms of expectations of new hires and continuing education?
- How can we incorporate more hands-on and practical experience in biomaterials education?
- What topics and techniques are best for K-12 outreach efforts?
- What are effective educational components of Biomaterials Days?
- What education-focused sessions at SFB meetings have you attended? What was good/bad about them?
- How should new faculty members approach teaching of biomaterials courses?
- How can we enhance graduate training in biomaterials?

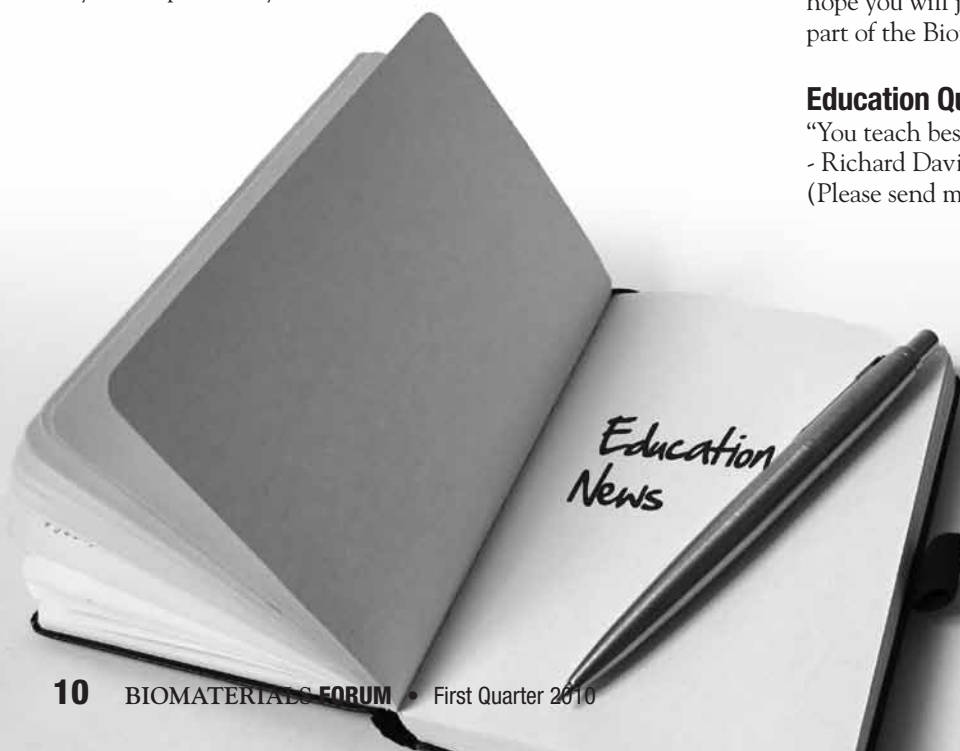
If you have ideas about contributions to this column, please contact me at jpsteg@umich.edu, and I will help you implement them. Education works best when it is a shared experience, so I hope you will join me in making this new column a rewarding part of the Biomaterials Forum.

Education Quote of the Quarter:

"You teach best what you most need to learn."

- Richard David Bach

(Please send me your favorite education-related quotes as well!)



Society For Biomaterials

2010 ANNUAL MEETING & EXPOSITION

Where Materials Meet Biology



Society For
Biomaterials
Giving life to a world of materials

Washington State
Convention Center

Seattle, Washington
April 21-24, 2010

Registration Brochure



Where Materials Meet Biology

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

WHERE MATERIALS MEET BIOLOGY

The theme for the 2010 Annual Meeting of the Society For Biomaterials, *Where Materials Meet Biology*, reflects the central position of the biomaterials discipline in fostering development of new implant materials and devices for improvement of the human condition. Accomplishing this, both in the past as well as in the future, requires integration of the latest advances in the physical and biological sciences, and engineering. The goal of the 2010 meeting will be to describe the latest innovations in materials science, molecular and cell biology, and engineering, and to identify new opportunities and mechanisms for translation of these findings into new or improved medical treatments for traumatic injury and disease. The program will include Symposia, General Sessions, Workshops, Panel Discussions, and Tutorials, covering all aspects of basic, applied and translational biomaterials science.

PRELIMINARY PROGRAM

(Tentative and subject to change)

Professor Allan Hoffman to Deliver Keynote Address

The Society For Biomaterials is pleased to announce Professor Allan S. Hoffman, as keynote speaker for its 2010 Annual Meeting and Exposition.

Professor Hoffman studied at M.I.T., where he received B.S., M.S., and Sc.D. degrees in Chemical Engineering between 1953 and 1957. He taught on the faculty of the Chemical Engineering Department at M.I.T. for a total of ten years and for the past 39 years he has been Professor of Bioengineering and Chemical Engineering at the University of Washington in Seattle, Washington, USA.

He was President of the Society for Biomaterials (US) in 1983-4, and received the Society's Clemson Award for Contributions to the Literature in 1984. He has also received the Founders' Awards from the Society for Biomaterials in 2000 and from the Controlled Release Society in 2007. He received the Biomaterials Science Prize of the Japanese Society for Biomaterials in 1990 and an International Recognition Award of the Society for Polymer Science, Japan in 2006. He was elected to the US National Academy of Engineering in 2005.

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HIGHLIGHTS OF THE 2010 MEETING WILL INCLUDE:

General Sessions:

A General Session is on a topic that is familiar to the general membership. Abstracts reflect the most current research in that field.

- Adipose Tissue Engineering and Biomaterial-Guided Stem Cell Behavior
- Advances in Ophthalmic Biomaterials Technology
- Applications of Nanomaterials in Medicine
- Biomaterial Technologies for Treating Non-Union Bone Defects: Research Developments and Clinical Applications
- Biomaterials as Stem Cell Niche
- Biomaterials for Directed Stem Cell Differentiation
- Biomaterials for Soft Tissue Engineering
- Biomimetic Materials for Tissue Engineering
- Cancer Drug Delivery
- Cardiovascular Controlled Drug Release
- Cellular Responses to Biomaterials and Cardiopathologies
- Chemoselective Chemistry for Biomaterials
- Controlled Release and Presentation Systems for Regulating Cell Behavior
- Dental Materials
- Emerging Frontiers in Design and Characterization of Bio-inspired Nanoscale Research & Materials
- Engineered Disease Models for Basic Research and Drug Discovery
- Engineering Immune Interactions with Biomaterials
- Engineering Therapeutic Delivery from Biomaterial Scaffolds for Cell Therapy
- Glycosaminoglycan Biomaterials in Medicine
- Molecular Mechanisms Mediating Protein-Surface and Cell-Surface Interactions
- Natural-based Polymeric Biomaterials and Composites
- Novel Imaging Methods for Mapping Cell Phenotype
- Probing the Surface of Biology
- Stimuli-responsive Scaffolds for Tissue Engineering: New Developments
- Surface Modification and the Biological Response
- Surface Modification of Three Dimensional Scaffolds for Tissue Engineering Applications
- Surface Optimization to Maximize Biosensor Performance

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.

- Applications of Nanomaterials in Medicine
- Biofilm-Material Interactions
- Cardiovascular Materials and Polyurethane Biomaterials
- Cell Function in 2D vs 3D Culture
- Multi-factor Drug Delivery for Musculoskeletal Regeneration
- Pluripotent Stem Cells in Regenerative Medicine
- Self-Assembly in Tissue Engineering
- Stem Cell-Biomaterial Interactions
- Surface Modification and the Biological Response
- Targeted Drug Delivery / Polymer Conjugates

Rapid Fire Sessions

Rapid Fire Sessions are one hour long sessions with two half hour blocks comprised of five five-minute presentations, and a five minute Q&A for each block.

- Applications of Nanomaterials in Medicine
- Biomaterials for Bone Repair
- Biomimetic Materials for Tissue Engineering
- Delivery and Immune Responses
- Engineering Materials for Medical Use: The New, the Improved, and the Coated
- Modern Tools And Techniques For Biomaterial Synthesis
- Orthopaedic Biomaterials for Bone Repair and Regeneration



Where Materials Meet Biology

WORKSHOPS

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

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

- *Surface Characterization of Biomaterials*
- *Tour: Institute for Stem Cell Research and Regenerative Medicine (ISCRM) at the University of Washington*

Surface Characterization of Biomaterials

The National ESCA and Surface Analysis Center for Biomedical Problems (NESAC/Bio) will be running a workshop on "Surface Characterization of Biomaterials." An overview of the latest developments and advances in biomedical surface analysis will be given. The fundamentals and capabilities of ESCA and ToF-SIMS will be emphasized. Selected examples of recent surface analysis applications in the areas of biomedical nanoparticles, molecular depth profiling of polymeric biomaterials, 2D/3D imaging of biological samples, and analysis of biological molecules at interfaces will be presented. Attendees will gain an appreciation for detailed characterization biomedical surface analysis methods can provide for a wide range of biomaterials.

Tour: Institute for Stem Cell Research and Regenerative Medicine (ISCRM) at the University of Washington

A tour of the new Institute for Stem Cell and Regenerative Medicine (ISCRM) at the University of Washington's South Lake Campus is planned. Participants will view the facilities and equipment used for stem cell research, and will have the opportunity to interact with ISCRM researchers and bring about possible research collaborations. This event is to be held in tandem with the NESAC/Bio surface analysis workshop at the UW main campus. On Wednesday around noon, participants will be provided with a box lunch at the ISCRM. Following lunch, an overview presentation of ISCRM research areas and facilities will be given to the tour participants. Following the overview, participants will be given a choice of ISCRM laboratory tours (Pluripotent stem cell core,

Histology and imaging, Magnetic resonance imaging spectroscopy, Cardiovascular biology and, maybe, Spinal cord regeneration, and Retinal regeneration) to talk with the researchers, see experiments, view research poster presentations and better understand the science and the equipment used to pursue the research. The participants will select two labs each that they would like to see in order to enable small groups to tour each lab.

PANEL DISCUSSIONS

Panel discussions are a format that foster open debate on a topic. The invited guests include renowned experts in the area of focus and the chair allows time for open discussion with the audience.

- *Advancing Biomaterials Education*
- *After My Degree – Industry or Academia?*
- *Grand Challenges for Biomaterials Science and Engineering Research and Education*
- *Surgeons Panel: Overcoming Obstacles to Innovation*

Advancing Biomaterials Education

This is a multi-faceted panel discussion to address topics of interest in biomaterials education both at the college level with new methodologies & techniques as well as changing the way biomaterials-related courses are taught to produce better qualified graduates. Advantages and shortcomings of current graduates will be addressed. Additionally, K-12 outreach module development will be discussed. The focus on outreach is designed to address the issue of slowing the 'leaky pipeline' with respect to the loss of potential engineers.

After My Degree – Industry or Academia?

This panel and networking luncheon will provide an opportunity for graduate students to explore different career options. Speakers from industry and academia will discuss their career paths and provide insight and advice. Each lunch table will include students and at least one SFB leader or member currently in academia or industry. After the presentations, there will be time for students to network and discuss their questions.

Lunch will be provided and you must check the box on the registration form if you intend to participate as this is a ticketed event limited to the first 200 SFB student members only.

Grand Challenges for Biomaterials Science and Engineering Research and Education

In 2009 the National Academy of Engineering issued a list of fourteen Engineering Grand Challenges that must be addressed to achieve a sustainable, economically robust, and politically stable future (<http://www.engineeringchallenges.org/>). The two NAE Engineering Grand Challenges most relevant to biomaterials are "Engineer Better Medicines" and "Engineer the Tools of Scientific Discovery." However, these alone do not come close to encompassing the spectrum of critical issues faced by modern biomaterials science and engineering. A panel of seven esteemed members of the National Academy of Engineering, National Academy of Science, and the Institute of Medicine will present their thoughts on the scientific, engineering, clinical, regulatory, ethical and educational Grand Challenges facing the research, education and business communities that comprise the Society For Biomaterials. Topics include but are not limited to molecular mediation, drug delivery, organ restoration, tissue reconstruction, sensing, diagnostics, imaging, wound healing, prosthetics and cosmetics. It is hoped that a multi-component "Biomaterials Manifesto" will arise from this event.

Surgeons Panel: Overcoming Obstacles to Innovation

Successful innovation in the field of biomaterials requires careful planning and a knowledge of the processes involved and the obstacles to overcome. The purpose of this program will be to give a brief overview of the experiences and challenges today regarding biomaterials and implants and where we think we will be tomorrow. The following topics will be addressed during this panel discussion: the process of innovation; intellectual property; academic/industry collaborations and associated conflicts of interest; off-label use of implants; the +/- of clinical trials; and obstacles specific to biologics. While many of the examples that will be used are related to orthopaedics, the experiences can be relevant to other medical disciplines.

TUTORIALS

The purpose of a tutorial is to teach attendees about a specific technology or focus area. It may include up to two presenters and time for questions and answers. The invited speakers are selected for their experience in the field, as well as their ability to teach fundamental topics that are of increasing importance to a wide range of biomaterials scientists and engineers. Attendance at the tutorial is included with the general meeting registration. In 2010, the tutorial topics will be:

- *Chemo-selective Chemistry*
- *Evaluation of Retrieved Implants*
- *Hands-On Tutorial for Scaffold Fabrication*
- *Statistics in the Design of Experiments*

Chemo-selective Chemistry

Increasingly, biomaterials are being synthesized from biomolecules and polymers that possess complex chemical reactivity, necessitating the use or development of highly chemoselective conjugation techniques. Recently developed approaches such as native chemical ligation, click chemistry, chemoselective surface modification, and engineered protein-protein interactions offer powerful routes for precisely constructing highly defined biomaterials from such complexly reactive biomolecules and polymers. This tutorial will provide an overview of recently developed chemoselective chemistries, along with practical guidance and tips for avoiding common pitfalls associated with them. The tutorial will be directed at two audiences: those wishing an overview of available chemoselective chemistries for synthesizing specific biomaterials of interest, and those currently employing chemoselective chemistries who may be seeking a forum for troubleshooting aspects of those evolving techniques. The tutorial will close with a short question-and-answer discussion session with the panel for this purpose.

Evaluation of Retrieved Implants

How do we evaluate forensically whether an implant is biocompatible? Development of a biomaterials course with a lab section should be one goal of a comprehensive bioengineering curriculum. Not only would this be a useful introduction to implant pathology, but it would provide practical experience in implant evaluation. In this tutorial an expert in retrieval pathology will present



Where Materials Meet Biology

example cases. Each would be examined from three perspectives: 1) Biomaterial characterization, 2) Clinical experience, and 3) Host response to the implant. This will be followed by a discussion of future prospects for the field.

Hands-on Tutorial for Scaffold Fabrication

Many intriguing strategies for fabricating 3D tissue scaffolds have been developed. Are you interested in learning these approaches? Would you like to learn how to electrospin nanofibers? How about directing assembly of microgels? What about freeform fabrication of designer scaffolds? This “hands-on wet tutorial” will provide practical information on several scaffold fabrication techniques with “wet” demonstrations by experts and opportunities for hands-on instruction. Any level of scientist from beginner to advanced is welcome. The only requirement is a desire to learn new scaffold fabrication techniques.

Statistics in the Design of Experiments

Knowledge of statistics is fundamental in designing and explaining the biological experiments. Every student and researcher should understand basic concepts of statistics and know how to use them in their experiments.

NSF AND NIH FUNDING OPPORTUNITIES IN BIOMATERIALS SCIENCE AND ENGINEERING

This information session will feature presentations by National Science Foundation and National Institutes of Health program managers describing funding opportunities available to biomaterials scientists and engineers. The session will be of interest to faculty, students and researchers seeking to identify funding for their research activities. The presentations will be followed by a question and answer period where you can have your government funding questions answered.

TECHNOLOGY & TRAINING FORUMS

These Forums will be technically-based educational opportunities hosted by SFB corporate supporters.

DSM Biomedical: “Biomaterials in a New Role: Treatment and Prevention of Infectious Diseases”

Biomaterials are commonly used to repair, replace or augment body parts damaged by disease, trauma and aging. Cardiovascular, orthopedic, ophthalmic, and general surgical applications of high-performance biomedical polymers are well established, and are expanding rapidly. Increased understanding of how pathogens invade the body, and novel methods for modifying and characterizing polymer surfaces suggest *new* uses for biomaterials: as *selective adsorbents for bacteria, viruses and parasites in the treatment of disease*. Applications under development include extracorporeal affinity columns that ‘clean’ the blood and reinfuse it (after depleting it of pathogens), and small cartridges for ‘purifying’ banked blood during collection or transfusion. For example, properly designed adsorbent beds with covalently-bonded heparin can bind cytokines and many pathogens onto a modified polymer surface that is well known to be safe in bloodcontacting applications.

Veeco Instruments Inc.: “Atomic Force Microscopy: Characterizing Biocompatibility at the Nanoscale”

The events that occur in determining the biocompatibility of a biomaterial are all based on molecular-scale interactions. Understanding how the properties of a biomaterial can influence these interactions has important implications to ensuring successful development of medical devices and tissue scaffolds. Atomic force microscopy is an ideal technique for these molecular-scale measurements, as it can not only provide nanometer-resolution 3D topography images and quantitative measurements of surface roughness and nanomechanical properties but it can obtain these data *in situ* and in real time, under near-physiological time. This forum will educate attendees on the latest state of the art AFM technology for biomaterials characterization including a “hands-on” session on integrated AFM and optical microscopy.

TENTATIVE PROGRAM SCHEDULE

(Subject to change)

WEDNESDAY, APRIL 21, 2010

9:00am – 12:00pm	Workshop 1: Surface Characterization of Biomaterials
12:00pm – 7:00pm	Registration Open
12:00pm – 4:15pm	Workshop 2: Tour: Institute for Stem Cell Research and Regenerative Medicine (ISCRM) at the University of Washington
4:30pm – 6:00pm	Technology and Training Forums
6:00pm – 6:45pm	Opening Ceremony
6:45pm – 7:30pm	Keynote Address: There May Be a Smart Polymer in your Biomaterials Future! Allan S. Hoffman <i>Professor of Bioengineering University of Washington</i>
7:45pm – 8:45pm	Opening Reception <i>(wine & cheese served)</i>

THURSDAY, APRIL 22, 2010

7:00am – 6:00pm	Registration Open
7:00am – 8:00am	Special Interest Group Meetings

8:00am – 10:00am: **Concurrent Session I**

- Biomimetic Materials for Tissue Engineering I
- Biomaterial Technologies for Treating Non-Union Bone Defects: Research Developments and Clinical Applications
- Natural-based Polymeric Biomaterials and Composites
- Stem Cell-Biomaterial Interactions (Symposia)
- Surface Modification and the Biological Response I (Symposia)
- Targeted Drug Delivery / Polymer Conjugates (Symposia)

10:00am – 1:00pm **Exhibit Hall Open**

10:00am – 10:30am **Break**

10:30am – 12:00pm **Plenary Session I Clemson Award for Contributions to the Literature** Gordana Vunjak-Novakovic, PhD *Columbia University*

C. William Hall Award Nicholas Peppas, ScD *The University of Texas at Austin*

Clemson Award for Basic Research William Reichert, PhD *Duke University*

12:00pm – 1:00pm **Lunch** *(on own)*

12:00pm – 1:00pm **Student Career Fair**

12:00pm – 1:00pm **Special Interest Group Meetings**

1:00pm – 3:00pm **Concurrent Session II**

- Biomimetic Materials for Tissue Engineering II
- Engineering Therapeutic Delivery from Biomaterial Scaffolds for Cell Therapy
- Applications of Nanomaterials in Medicine I
- Surface Modification and the Biological Response II



Where Materials Meet Biology

1:00pm – 2:00pm **Concurrent Rapid Fire Sessions I & II**

I. Engineering Materials for Medical Use: The New, the Improved, and the Coated
 II. Biomaterials for Bone Repair

2:00pm – 3:00pm **Concurrent Rapid Fire Sessions III & IV**

III. Orthopaedic Biomaterials for Bone Repair and Regeneration
 IV. Modern Tools And Techniques For Biomaterial Synthesis

3:00pm – 3:15pm **Break**

3:00pm – 6:15pm **Exhibit Hall Open**

3:15pm – 4:45pm **Concurrent Session III**

- Adipose Tissue Engineering and Biomaterial-Guided Stem Cell Behavior
- Glycosaminoglycan Biomaterials in Medicine
- Molecular Mechanisms Mediating Protein-Surface and Cell-Surface Interactions
- Probing the Surface of Biology
- Surface Modification of Three Dimensional Scaffolds for Tissue Engineering Applications
- Multi-factor Drug Delivery for Musculoskeletal Regeneration (Symposia)

4:45pm – 6:15pm **Poster Session I and Exhibition Reception**

6:30pm – 8:00pm **Special Interest Groups Mixer**

FRIDAY, APRIL 23, 2010

7:00am – 5:30 pm **Registration Open**

7:00am – 8:00am **Special Interest Group Meetings**

8:00am – 9:30am **Concurrent Session IV**

- Pluripotent Stem Cells in Regenerative Medicine (Symposia)
- Cardiovascular Controlled Drug Release
- Dental Materials
- Novel Imaging Methods for Mapping Cell Phenotype
- Self-Assembly in Tissue Engineering (Symposia)
- Surface Optimization to Maximize Biosensor Performance

9:30am – 10:00am **Break**

9:30am – 5:30pm **Exhibit Hall Open**

10:00am – 11:15am **Annual Business Meeting**
(coffee provided)

10:00am – 11:15am **National Student Chapter Meeting**

11:30am – 1:00pm **Concurrent Session V**

- Biomaterials as Stem Cell Niche
- Advances in Ophthalmic Biomaterials Technology
- Cellular Responses to Biomaterials and Cardiopathologies
- Chemoselective Chemistry for Biomaterials
- Biofilm-Material Interactions (Symposia)
- Emerging Frontiers in Design and Characterization of Bio-inspired Nanoscale Research & Materials

1:00pm – 2:00pm **Lunch** *(on own)*

1:00pm – 2:00pm **NSF and NIH Funding Opportunities in Biomaterials Science and Engineering**

1:00pm – 2:00pm **Special Interest Group Meetings**

2:00pm – 4:00pm **Concurrent Session VI**

- Tutorial: Hands-On Scaffold Fabrication
- Tutorial: Chemo-selective Chemistry
- General Session: Biomaterials for Soft Tissue Engineering

2:00pm – 3:00pm	Concurrent Rapid Fire Sessions V & VI	10:00am – 10:30am	Break
V. Biomimetic Materials for Tissue Engineering		10:30am – 12:00pm	Plenary Session II Clemson Award for Applied Research Michael Yaszemski, MD, PhD <i>Mayo Clinic College of Medicine</i>
VI. Delivery and Immune Responses			
3:00pm – 4:00pm	Concurrent Rapid Fire Session VII		Founders Award Stuart Cooper, PhD <i>Ohio State University</i>
VII. Applications of Nanomaterials in Medicine			Young Investigator Award Todd McDevitt, PhD <i>Georgia Institute of Technology</i>
3:00pm – 4:00pm	Tutorial: Evaluation of Retrieved Implants		
4:00pm – 5:30pm	Poster Session II		
5:30pm – 6:30pm	Town Hall Meeting	12:00pm – 1:30pm	Lunch (on own)
6:45pm – 9:30pm	BASH	12:00pm – 1:30pm	Student Luncheon / Panel Discussion: After My Degree – Industry or Academia?
<i>Join your colleagues at the 2010 BASH Reception being held at the Washington State Convention Center</i>			

SATURDAY, APRIL 24, 2010

7:00am – 4:00pm	Registration Open	1:30pm – 3:30 pm	Panel Discussion: Grand Challenges for Biomaterials Science and Engineering Research and Education
7:00am – 8:00am	All Special Interest Group Officers Meeting (open to all SIG members)	3:30 – 3:45	Break
8:00am – 10:00am	Concurrent Session VII	3:45 pm – 5:45pm	Concurrent Session VIII
<ul style="list-style-type: none"> • Panel Discussion: Surgeons: Overcoming Obstacles to Innovation • Tutorial: Statistics in the Design of Experiments • Engineering Immune Interactions with Biomaterials • Stimuli-responsive Scaffolds for Tissue Engineering: New Developments • Cell Function in 2D vs 3D Culture (Symposia) • Controlled Release and Presentation Systems for Regulating Cell Behavior 		<ul style="list-style-type: none"> • Panel Discussion: Advancing Biomaterials Education • Applications of Nanomaterials in Medicine II (Symposia) • Biomaterials for Directed Stem Cell Differentiation • Cancer Drug Delivery • Cardiovascular Materials and Polyurethane Biomaterials (Symposia) • Engineered Disease Models for Basic Research and Drug Discovery 	



Where Materials Meet Biology

General Information

All sessions of the meeting, including exhibits, posters, and oral presentations will take place at the Washington State Convention Center. **Photographs and/or videos of any slide or poster presentations are strictly prohibited.**

Registration

All attendees are expected to register for the meeting. Register early and get the pre-registration fees, which are much lower than on-site registration. The pre-registration deadline is April 1, 2010.

Registration fees include: Abstract CD-ROM, admittance to all scientific sessions, tutorials, technology and training forums, panel discussions, exhibits, opening reception, poster and exhibition reception, breaks and the BASH. (Additional fees apply to Wednesday workshops).

BASH

Join your colleagues at the 2010 BASH Reception being held at the Washington State Convention Center on Friday, April 23, 2010 from 6:30 pm to 9:30 pm.

Member Rates

Member rates apply to members of the Society For Biomaterials, USA, other world biomaterials congress societies, and TERMIS. Members of TERMIS or world biomaterials congress societies must include a photocopy of a current dues receipt or membership card with registration to qualify for member discount. World biomaterials congress societies are Australian Society for Biomaterials, European Society for Biomaterials, the Japanese Society for Biomaterials, and Korean Society for Biomaterials. Probationary Special Interest Group members do not qualify for member rate. Full-time student and Post-graduate meeting registration includes access to all scientific sessions, Opening Ceremony Reception, and a complimentary Abstract CD-ROM. To qualify for discounted registration rates, proof of full-time student or post-graduate status must accompany registration.

Cancellations/Refunds

To cancel your registration and receive a refund, a written request must be received by April 1, 2010. Cancellation requests received by this date will receive a refund less a \$75 processing fee. Requests will be processed after the meeting. All requests received after April 1, 2010, will forfeit 100 percent of monies paid.

Web Registration

Registration for members and non-members may be submitted via the SFB Web site, www.biomaterials.org. **NO REGISTRATIONS WILL BE ACCEPTED VIA TELEPHONE.**

Final Program,

Certificates of Attendance, and Visa

Certificates of attendance will be available for all registrants at the on-site registration desk. Badges will be required to be worn at all functions of the meeting. Participants are expected to make their own travel arrangements, and procure their own visas. The final program will be distributed at the meeting.

The official language of the meeting is English.

Business casual is the recommended dress for the meeting.

Transactions Book

All of the abstracts being presented at the meeting, both oral and poster will be on CD-ROM, which is included in your meeting registration. A printed Transactions Book will be available for purchase, but must be ordered in advance.

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 indicate on your registration form.

Sponsors and Exhibits

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

In order to provide exhibitors with steady exposure to conference 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 Annual Meeting page of the society's Web site (www.biomaterials.org).

BreAnne Clark, Exhibits Manager

(856) 439-0500 ext. 4486 • bclark@biomaterials.org

Exhibit Hours

Thursday, April 22 10:00 a.m. – 1:00 p.m., 3:00 p.m. – 6:15 p.m.
Friday, April 23 9:30 a.m. – 5:30 p.m.

REGISTRATION FORM

Please print or type.

First Name _____ Surname/Last Name _____

Title _____ Degree _____

Specialty 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 _____

SCIENTIFIC REGISTRATION

	Member On Or Before April 1	Post-Grad Member On Or Before April 1	Student Member On Or Before April 1	Retired Senior Member On Or Before April 1	Non-Member On Or Before April 1	Post-Grad Non-Member On Or Before April 1	Student Non-Member On Or Before April 1	Member After April 1	Post-Grad Member After April 1	Student Member After April 1	Retired Senior Member After April 1	Non-Member After April 1	Post-Grad Non-Member After April 1	Student Non-Member After April 1	Government Employee Rate
Meeting & Exhibit Registration	<input type="checkbox"/> \$25	<input type="checkbox"/> \$35	<input type="checkbox"/> \$15	<input type="checkbox"/> \$16	<input type="checkbox"/> \$75	<input type="checkbox"/> \$47	<input type="checkbox"/> \$14	<input type="checkbox"/> \$25	<input type="checkbox"/> \$40	<input type="checkbox"/> \$15	<input type="checkbox"/> \$19	<input type="checkbox"/> \$85	<input type="checkbox"/> \$25	<input type="checkbox"/> \$18	<input type="checkbox"/> \$50
Workshop I: Surface Characterization	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$25	<input type="checkbox"/> \$65	<input type="checkbox"/> \$45	<input type="checkbox"/> \$25	<input type="checkbox"/> \$50	<input type="checkbox"/> \$30	<input type="checkbox"/> \$20	<input type="checkbox"/> \$25	<input type="checkbox"/> \$65	<input type="checkbox"/> \$45	<input type="checkbox"/> \$25	<input type="checkbox"/> \$50
Workshop II: ISCRM Tour	<input type="checkbox"/> \$100	<input type="checkbox"/> \$65	<input type="checkbox"/> \$30	<input type="checkbox"/> \$50	<input type="checkbox"/> \$135	<input type="checkbox"/> \$95	<input type="checkbox"/> \$50	<input type="checkbox"/> \$100	<input type="checkbox"/> \$65	<input type="checkbox"/> \$30	<input type="checkbox"/> \$50	<input type="checkbox"/> \$135	<input type="checkbox"/> \$95	<input type="checkbox"/> \$50	<input type="checkbox"/> \$100

SCIENTIFIC REGISTRATION SUBTOTAL

\$

Student Luncheon/ Panel Discussion: After My Degree – Industry or Academia? 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 200 SFB student members only. (Saturday, April 24, 12:00 -1:00 p.m.)

OPTIONAL TRANSACTIONS (one CD-ROM included with each Meeting Registration)

- Transactions Book \$100: Member \$125: Non-Member
 Additional CD-ROM \$30

SOCIAL REGISTRATION

Opening Ceremony & Reception Extra tickets for Accompanying Guests (#) _____ x \$75 each

Includes Exhibition Reception (name of guest _____)

(one ticket included in Member & Non-Member Meeting Registration)

*** 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.

X _____
Signature of advisor or department chair

Advisor's Printed Name _____
 Advisor's Telephone _____
 Advisor's Email _____

THREE OPTIONS FOR REGISTRATION:	<ol style="list-style-type: none"> WWW.BIOMATERIALS.ORG Fax this registration form to 856-439-0525 Mail this registration form to: SFB Registration 15000 Commerce Parkway Suite C Mt. Laurel, NJ 08054
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TRANSACTION AND SOCIAL REGISTRATION SUBTOTAL

\$

TOTAL AMOUNT DUE

\$

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 _____

Hotel Information/Reservations

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

Sleeping room rates have been reserved for attendees at a conference rate of \$199.00 single/double occupancy which includes **COMPLIMENTARY INTERNET ACCESS**.

To reserve a room at the group rate, contact the hotel directly by calling their reservation desk at (888) 627-7056, please be sure to reference the Society For Biomaterials or on-line at www.biomaterials.org.

Sheraton Seattle Hotel
1400 6th Avenue
Seattle, Washington 98101 United States
Phone: (206) 621-9000
Sheraton Seattle Hotel -
CENTRAL RESERVATIONS: (888) 627-7056

Conference Rates:

\$199 per room, per night for single or double occupancy
\$235 per room, per night for single or double occupancy on Club Level. Suites available for rates starting at \$350.00 per person, per night.

The special room rate will be available until March 20, 2010 or until the group block is sold-out, whichever comes first, after this date the prevailing rates for the hotel will apply.

Conference rates are available from April 19, 2010 to April 25, 2010.

Nestled in the city's vibrant core, The Sheraton Seattle Hotel is a gateway to the fabulous Northwest. The AAA four-diamond Sheraton Seattle Hotel offers the best of all worlds for the traveler visiting Seattle. The hotel is located next to all the sights, sounds, and experiences of the greatest city in the great northwest, and is just steps from Pike Place Market, world-class shopping, exciting nightlife, and gourmet restaurants.

2009 University of Kentucky-Case Western Reserve University Biomaterials Day

David A. Puleo, Center for Biomedical Engineering, University of Kentucky

More than 85 scientists, engineers and clinicians from eight institutions registered for the University of Kentucky-Case Western Reserve University Biomaterials Day, which took place September 25, 2009 in Lexington, Kentucky. The program was kicked off with a keynote lecture by Dr. James Anderson of Case Western Reserve University. A total of 50 presentations were given, covering a range of biomaterials and applications, during four oral sessions and two poster-viewing sessions. Three of the oral sessions began with invited talks by young investigators from regional universities (University of Louisville, Purdue University and Case Western Reserve University). Attendees had multiple networking opportunities, including morning and afternoon breaks, a sit-down lunch and an evening reception.

Education News



Students from the University of Kentucky (UK) and Case Western Reserve University (CWRU) participated in blinded abstract review, presentation judging and chairing oral presentation sessions. Two awardees were selected for both oral and poster presentations. Oral presentation winners were Samantha Meenach (UK) and Alyssa Master (CWRU), and the poster winners were Justin Poag (UK) and Patrick Schexnailder (Purdue University). In addition to these scientific awards, modest travel awards were made to subsidize attendance at the meeting.

2009 Biomaterials Day at Clemson University

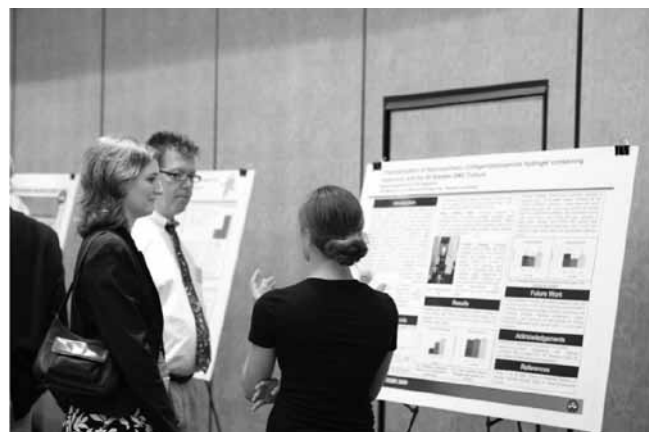
*Delphine Dean and Jiro Nagatomi,
Department of Bioengineering, Clemson University*

Biomaterials Day at Clemson University was held at the Madren Conference Center in Clemson, S.C., July 23, 2009. This one-day joint event, sponsored by the Society For Biomaterials, featured student research presentations, keynote lecture, guest lectures and panel discussion on professional career development for students. The number of participants (more than 100) and level of student discussion and questions well exceeded expectations. Attendees included students and faculty from Clemson University, Georgia Institute of Technology, University of Massachusetts Amherst, University of North Carolina at Charlotte, University of South Carolina, Medical University of South Carolina, as well as undergraduate students participating in summer undergraduate research programs representing a total of 15 different universities. Travel awards were provided to students to help defray the cost of travel. The Clemson student chapter of SFB provided help with registration tables, poster set up, moderating sessions, preparation of proceedings and conference bags, etc. The student officers also reached out to students from other universities to initiate future social/scientific events and to offer assistance in development of new student chapters.

The symposium featured three invited guest lectures. The morning started with a keynote talk by Dr. Tim Topoleski from the University of Maryland Baltimore County. Dr. Topoleski encouraged students to remember the human aspect of biomaterials and realize people are a key component to all work, including the research they are currently doing. The second guest speaker, Dr. Todd Purves from the Medical University of South Carolina, gave a clinical perspective to how biomaterials are used in urology. The final guest speaker was the 2009 SFB young investigator award recipient, Dr. Niren Murthy from the Georgia Institute of Technology. He presented work from his lab on new materials for treating and imaging inflammatory diseases. Besides these excellent guest lectures, the day also featured oral presentation sessions and poster sessions by undergraduate and graduate students. All students demonstrated that they made remarkable achievements in research. Five students were selected for awards and received certificates and monetary awards, which were made possible by corporate donors (Poly-Med Inc., Selah Technologies LLC., and Zeus Inc.). Jay Sy from the Georgia Institute of Technology won the graduate student award with his talk on drug delivery strategies for treating cardiac dysfunction following myocardial infarction. The undergraduate oral presentation award went to Jordan Maivelett from Clemson University for his presentation on his work on cell seeding of heart valve and vascular scaffolds and tissue engineering in diabetes. The quality of posters was outstanding as well, and a working lunch provided plenty of time for attendees to peruse the posters while enjoying a complimentary, catered lunch. Honorable mention for the posters were Rachel Ostendorff of Clemson University for her work on characterization of semi-synthetic collagen/ploxamine hydrogel containing hyaluronic acid for 3D bladder smooth muscle cell culture and Lauren Sosdian, also of Clemson



Student award winners (from left to right): graduate student presentation winner, Jay Sy (Georgia Institute of Technology), undergraduate student presentation winner, Jordan Maivelett (Clemson University), best poster award winner, Adam Nelson (University of Massachusetts Amherst), and honorable mention poster award winners, Rachel Ostendorff (Clemson University) and Lauren Sosdian (Clemson University)



Rachel Ostendorff explains her poster on 3D bladder smooth muscle cell culture to interested attendees.



Jordan Maivelett presents his cardiovascular tissue engineering research.

By Guigen Zhang, *University and Research Institution News*
Contributing Editor

In the midst of budget cuts everywhere, many colleges and universities are trimming and even eliminating liberal arts majors like philosophy and English literature in an effort to make students' college experiences relevant—relevant in a sense that the students' educations are geared toward the kinds of jobs they can expect. In a similar frame of thinking, many engineering programs are pushing to reclaim the credit hours for engineering content once taken up by humanistic content. In the face of rising costs for college tuition and increasing scrutiny from tuition-paying parents, who could argue against such a move?

This move, it seems, makes sense only from the surface. When one digs a bit deeper, it gets a lot blurrier. Take the current economic situation: if we have learned anything, it is that many of yesterday's jobs have disappeared. So how sure can we be that the perceived jobs of tomorrow will be there when they graduate? After all, as Peter Drucker stated, the only thing we know for sure about the future is that it will be different.

To make things even more interesting, a recent survey by the Association of American Colleges and Universities reveals that 89 percent of employers want colleges to put more emphasis on "the ability to effectively communicate orally and in writing," while 81 percent ask for better "critical thinking and analytical reasoning skills" and 70 percent are looking for "the ability to innovate and be creative." This wish list points to a college experience with a heavy emphasis on a liberal education.

So, why is this relevant? This question prompted me to ask another: what role are colleges and universities supposed to play in one's education? Or, what constitutes a college education?

2009 Biomaterials Day at Clemson University

Continued from previous page.

University, for her work on the effect of radiation on the mechanical properties of bone. The winner of the poster award was Adam Nelson of University of Massachusetts Amherst for his work on the cross-linking effects of printed calcium chloride with alginate.

There were many career development opportunities for students. In addition to the research talks presented and interactions with faculty mentors, the symposium included opportunities for students to interact with representatives from several local biomaterials companies. One of the most popular sessions was a Career Discussion Panel in the afternoon. The panel featured representatives from industry, government lab, and academia, discussing the pros and cons of careers in each area. Panelists included Dr. Frank Alexis, Assistant Professor of Bioengineering at Clemson University, Dr. Brian Powell, Assistant Professor of Environmental Engineering at Clemson University (formerly at DOE Lawrence Livermore National Lab), and Mrs. Sheila Nagatomi, Biological Sciences Section Manager at Poly-Med Inc. In addition, panel members gave tips on how to succeed for each career path and responded to questions from students in the audience.

The simplest answer I can find is this: prepare students to collect and connect the dots. Here, collecting dots is the acquisition of information and known theories and principles, while connecting them is the integrative process in which the acquired facts and wisdoms are processed and integrated into interconnected knowledge and insight. This means education is a two-layer process: the first layer is the collection of the dots and the second layer is the connection of these dots.

Now, if we work within this frame of thinking, the question we ought to ask is: in one's college education, do we want to focus only on the collection part or do we want to go beyond that? Obviously, without the collection of the dots, connecting them will be out of the question; with only the collection of the dots, however, the relevance of an education will be very limited.

The move to a more job-relevant specialized college experience seems to focus on the collection part. How much information can we pack into a four-year curriculum? How much of it will be outdated by the time students emerge in the real world? Since new information pops up every day, acquisition of knowledge has to be a life-long endeavor. So, if we want to make college education really relevant, why are we not cultivating in students the skills to acquire knowledge, the ways to process information, and the abilities to connect the dots?

I do not think I could win the argument against the trimming and cutting of liberal arts majors, but I do hope engineering programs teach students to not only collect the dots but connect them as well.

American Institute for Medical and Biological Engineering News

AIMBE News
Alan Litsky, AIMBE News
Contributing Editor

The American Institute for Medical and Biological Engineering (AIMBE), was founded in 1991 “to establish a clear and comprehensive identity for the field of medical and biological engineering” and “seeks to serve and coordinate a broad constituency of medical and biological scientists and practitioners, scientific and engineering societies, academic departments and industries.” The Society For Biomaterials is a member society of AIMBE, and as such, has many areas of overlapping interest; two SFB members serve on the AIMBE Council of Societies. More about the organization can be found at www.aimbe.org.

The AIMBE staff publishes a bi-weekly Federal update monitoring governmental activities and initiative relevant to their constituencies. Several events discussed in recent issues may be of particular interest to SFB members.

Appropriations Bill Passes

Congress has finally passed the Consolidated FY2010 Appropriations Act, establishing funding levels for FY2010 for agencies, including the National Institutes of Health and National Science Foundation. The bill will increase the NIH's budget by 2.3 percent from FY2009 to \$31.2 billion, \$692 million more than the FY2009 budget. While the increases are evidence of Congress' and the Administration's continued support for biomedical research, the Office of the Director of the NIH reports medical inflation for 2009 is expected to be around 3.8 percent—making the NIH budget essentially flat for FY2010, when adjusted for inflation.

The bill also gives the National Science Foundation \$6.9 billion, which is seven percent, or \$436 million, more than what it received in 2009. This is consistent with the President's goal of doubling funding at the NSF over the next decade.

510 (K) Process Changes

Rumors exist regarding the FDA's plans to overhaul and revamp the FDA's 510(k) process in response to recent highly publicized, seemingly politically driven approvals. Dr. Jeffrey Shuren, acting director for the FDA's Center for Devices and Radiological Health has stated the FDA is taking some measured, overdue steps toward updating its device clearance process. These steps promise to make the agency's approval process more transparent, more objective, and less political.

No final decisions have been made, but policy-makers seem to favor revising the 510(k) process rather than a dramatic overhaul which some fear could slow the availability of medical technologies.

NIH Approves New Stem Cell Lines for Research

Researchers gained greater access to stem cells to conduct research identifying new treatments and potential cures for diseases when the Obama administration authorized the use of new lines of stem cells for researchers. This marks a drastic change in federal support for stem-cell research, which had been severely limited by President Bush. “This is the first down payment on what is going to be a much longer list that will empower the scientific community to explore the potential of embryonic stem cell research,” says NIH Director Francis Collins.

NIH Announces National Research Registry

The National Institutes of Health has announced new Web site (ResearchMatch.org) to connect individuals interested in participating in clinical trials with researchers conducting the studies. The site is intended to be user friendly, and the service will cover an array of diseases.

ScienceWorksForUs.Org Web site Launched

Science Works For Us is an initiative highlighting the scientific research and related activities funded through the American Recovery and Reinvestment Act of 2009, also known as “the stimulus.” The centerpiece of the initiative is a Web site (www.ScienceWorksForUs.org) highlighting Recovery Act-sponsored research in all 50 states. The stimulus contained \$21.5 billion for scientific research, the purchase of capital equipment and science-related construction projects. This money, while less than three percent of the stimulus package, nonetheless represented a historic infusion of funding for research and represents an affirmation of the role of scientific inquiry and discovery in the short- and long-term economic recovery. The site contains information SFB members may find useful in advocating for support on a state or local level.

Surface Modification Method Affects Laminin Retention and Vascular Smooth Muscle Cell Proliferation under Strain

Joy P. Dunkers, Polymers Division, National Institute of Standards and Technology, Gaithersburg, Md.

* Official contribution of the National Institute of Standards and Technology; not subject to copyright in the United States.

Introduction

Mechanotransduction is the process by which mechanical signals are transferred to cells from the surrounding environment via one of several pathways such as the cytoskeleton or integrins^{1,2}. This process is often studied by culturing cells on flexible substrates treated with extracellular matrix proteins (ECM) and applying strain³. It is important to develop methods to anchor the protein to the substrate while under strain. Previous work focused on methods that promoted either physisorption, chemisorption, or covalent bonding between fibronectin or laminin and polydimethylsiloxane (PDMS) surfaces⁴. One particular chemisorption method resulted in the greatest amount and uniformity of laminin and highest vascular smooth muscle cell (SMCA10) proliferation under static conditions. This method involved the attachment of hydrolyzed aminopropyltrimethoxysilane (APTMS) to oxygen plasma treated PDMS to provide an amine for polar interaction with the ECM proteins. This work investigates whether the more favorable results from the aforementioned chemisorption (silane-linked) method actually translate into improved SMCA10 proliferation on laminin coated PDMS as compared to physically adsorbed (plasma only) laminin when subjected to mechanical strain.

Experimental

See publication by Pakstis and co-workers⁴ for surface treatment and cell culture information.

Results and Discussion

Laminins are a family of four-arm glycoproteins that interact with other proteins to form basement membranes. Conventional immunofluorescence (IF) was used to compare the amount of laminin on as-cured PDMS (unoxidized), plasma-only PDMS (oxidized), and silane-linked PDMS (oxidized and silane treated) (Figure 1). The asterisks show that, for 95 percent confidence, the amount of laminin on plasma-only and silane-linked PDMS is significantly greater than on as-cured PDMS and tissue culture polystyrene (TCPS), with no significant difference between as-cured PDMS and TCPS or between plasma-only and silane-linked treatments.

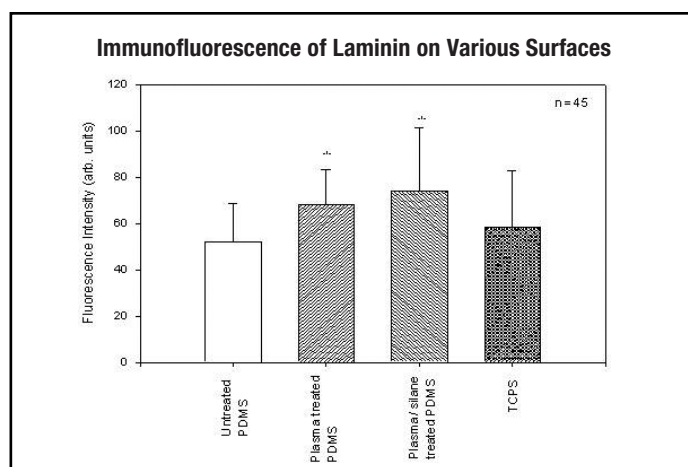


Figure 1: Relative amounts of laminin on PDMS compared to TCPS measured by indirect labeling. Error bars indicate one standard deviation. Both plasma treatments resulted in significantly more laminin than on as cured PDMS or on TCPS with $p < 0.05$. The amount of laminin on plasma-only treated versus silane-linked PDMS is not significantly different. Asterisks indicate intensities that are significantly different ($p < 0.05$) from those of untreated PDMS or TCPS.

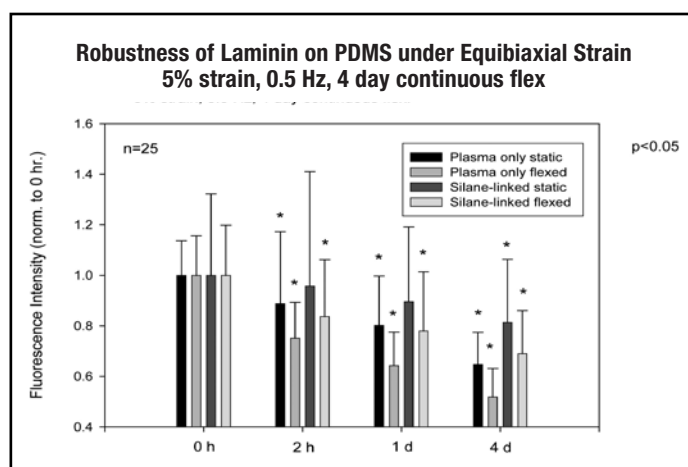


Figure 2: Comparison of laminin retention on PDMS surfaces with plasma-only and silane-linked treatments under static and equibiaxial strain (flexed) conditions for up to 4 d as measured by indirect labeling. Error bars indicate one standard deviation. Asterisks indicate intensities that are significantly different ($p < 0.05$) from 0 h.

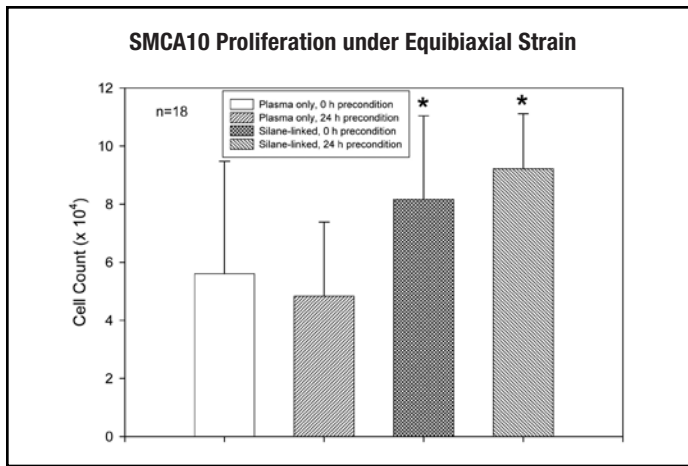


Figure 3: SMCA10 proliferation after 4 d for laminin on plasma-only and silane-linked surfaces. 45 k cells were seeded and attached for 12 h. Strain conditions: 0.5 Hz, 5% strain. 1 h strain, 23 h static for 2 d, then continuous strain for 2 d. Error bars indicate one standard deviation. Asterisks indicate the cells on both silane-linked conditions are statistically indistinguishable and significantly more than the plasma-only condition ($p < 0$).

It has been shown that laminin will bind to myoblasts through its long arm terminal carboxylic acid group⁵. We hypothesized that the silane-linked surfaces would be able to retain the laminin better than the plasma-only surfaces under mechanical deformation due to the strong polar interaction of the laminin with the silane primary amine. The laminin treated Bioflex (Hillsborough, N.C.)[®] culture dishes were either unstrained or underwent continuous equibiaxial stretching at 5 % strain, 0.5 Hz for a total of 4 d (flex condition). Figure 2 shows the amount of laminin on the Bioflex dishes as represented by IF intensity normalized to 0 h as a function of time, where the asterisks denote a significant difference in the averaged fluorescence intensity from 0 h. In comparing final amounts of laminin on the surfaces, the silane-linked/static has significantly more than the silane-linked/flexed, which has significantly more than the plasma-only/flexed. The plasma-only/static has more laminin than the plasma-only/flex.

Although there is no discernable difference in SMCA10 cell proliferation between plasma-only and silane-linked under

static conditions in control experiments, does this relationship hold when strain is applied to the substrate? Figure 3 compares SMCA10 cell proliferation for plasma-only and silane-linked laminin substrates with both 0 h and 24 h serum incubation prior to strain. Cells were counted after undergoing 0.5 percent equibiaxial strain at 0.5 Hz. The strain cycle was 1 h strain and 23 h static for 2 d then continuous strain for another 2 d. The results show that the increased cell proliferation for the 24 h serum incubation that occurred under static conditions (results not shown) has disappeared, most likely from dislodging the weakly bound serum proteins with strain. The ability of the silane-linked laminin treatment to remain on the surface under strain translates into almost double the cell proliferation when compared to the plasma-only case. SMCA10 viability was examined using live/dead staining (calcein AM/ ethidium homodimer) to confirm the efficacy of the surface treatments. There was a negligible number of dead cells after 4 d for the static and strained plasma-only and silane-linked conditions. The cells on both the plasma-only and silane-linked treatments showed a high degree of alignment after 4 d of strain.

This work has shown that it is the robust attachment of laminin to the PDMS substrate that strongly influences the ability of laminin and SMCs to remain attached during mechanical strain.

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- * Certain equipment, instruments or materials are identified in this paper in order to adequately specify the experimental details. Such identification does not imply recommendation by the National Institute of Standards and Technology nor does it imply the materials are necessarily the best available for the purpose.

Why you should still buy books, or borrow them from the library, when you can find almost anything on the Web for free:

Why you should still buy books, or borrow them from the library, when you can find almost anything on the Web for free: Google search engines are not bad, but rather than searching the Web yourself and getting overwhelmed, don't forget how helpful a good book can be. The editor has combed through the information available on a particular topic and has identified what is important, albeit from their perspective. Within a good book, the editor has assembled a group of important chapters that are all related to each other. The information is well organized and collected in one place, and there are often essential basic introductions to the subject matter and literature reviews. Lastly, there are

Book Reviews

By Liisa Kuhn, Assistant Professor, University of Connecticut Health Center, Center for Biomaterials, Farmington, Conn.

often chapters on subjects or technologies that you might not have read about otherwise, yet are related, and may lead to valuable new insight about your particular research.

Request for Information

This column highlights some of the best new books in the field. However, I'm curious to know what your favorite biomaterials books are. If there's a biomaterials book that is a favorite of yours, please send me an email with the title and author so I can feature it in an upcoming column about biomaterials textbooks. lkuhn@uchc.edu.

Cellular and Biomolecular Recognition

Edited by Raz Jelinek, 349 pages, new and used from \$141
Copyright 2009 by Wiley-VCH, ISBN: 978-3-527-2265-7

Description and Review

A primary mechanism behind normal and pathological biological system function is molecular recognition, such as that which occurs during the deceptively simple interaction between two proteins. The interaction can only occur in a normal fashion if the protein has the correct amino acid sequence, the correct protein folding has occurred, and uncontrolled agglomeration is resisted. Single point mutations lead to sickle cell anemia, uncontrolled protein aggregation leads to Alzheimer's disease. The editor, Raz Jelinek from Ben Gurion University, Israel, has compiled fascinating descriptions of various interactions between biological molecules and interactions between biomolecules and cells. Using examples of complex structures or molecular interactions found in biology as a springboard for each chapter, various concepts and synthetic chemistries, which recapitulate biomolecular interactions, are highlighted. Elegant synthetic biomimetic systems designed to bind specific proteins (molecular imprinting), intriguing virus-like particles, catalytic antibodies, nanoparticles with defined binding sites, and biomineralization using viral nano-rods as templates, are examples of the types of materials found in this book. Advanced bioanalytical techniques play a significant role in elucidating the molecular basis of diverse biological process, thus the book concludes with chapters on applications of surface plasmon resonance, atomic force microscopy and fluorescence spectroscopy to the characterization of biomolecular interactions. It is a unique collection of novel approaches that probe our understandings of molecular recognition in biological systems from different directions. This is a significant book because it educates the reader about complex chemistries in biological systems that may provide biomimetic insights for altogether new drug therapies for disease, or novel imaging molecules, or new biomaterials with the capability for self-assembly. The contributors to this book are many of the best from around the world.

From the contents:

- Development of Functional Materials from Rod-Like Viruses
- Chiral Molecular Imprinting as a Tool for Drug Sensing
- Biomimetic Nanoparticles Providing Molecularly Defined Binding Sites
- Interaction Between Silica Particles and Human Epithelial Cells
- Multivalent Synthetic Receptors for Proteins
- Catalytic Antibodies for Selective Chemotherapy
- Natural and Synthetic Activators of the Immune Response
- Membrane-Active Natural and Synthetic Peptides and Peptidomimetics
- Analysis of Biological Interactions and Recognitions Using Fluorescence, Colorimetric Methods, Atomic Force Microscopy, Surface Plasmon Resonance, and more.

Cellular and Biomolecular Recognition is recommended to researchers with strong interests in interfacial chemistry. The introductions at the start of each chapter allow the complex material to be accessible to readers at various levels of chemistry background. The multi-disciplinary nature of the book contents makes it potentially valuable to a wide audience.

Book Reviews

By Liisa Kuhn, Assistant Professor, University of Connecticut Health Center, Center for Biomaterials, Farmington, Conn.

Advanced Biomaterials

Edited by Kidramjit Basu, Dharendra S. Katti, and Ashok Kumar.
Copyright 2009 by the American Ceramic Society. Published by John Wiley and Sons.
746 pages, ISBN#: 978-0-470-19340-2, new and used from \$120.00.

Description and Review:

This volume is an outcome of the International Conference on Design of Biomaterials organized at Indian Institute of Technology Kanpur, India during December 8-11, 2006, but it doesn't read like a classic, disjointed conference proceedings. Rather, the volume has been designed to serve as an undergraduate or graduate textbook and therefore the editors have split the book into three sections: Fundamentals, Processing and Applications. Each section contains a lead-in, basic introductory chapter: Fundamentals of Biomaterials and Biocompatibility, Introduction to Processing of Biomaterials, and Biomaterial Applications. World leaders have contributed to the book and include some of our well-known SFB members: Racquel LeGeros, Guy Daculsi, Cato Laurencin, Thomas Webster and Helen Lu.

From the contents:

- Fundamentals of Hydroxyapatite and Related Calcium Phosphates
- Integrated Titanium Dental Implants
- Nanomaterials for Improved Orthopedic and Bone Tissue Engineering Applications
- Functionally Graded All Ceramic Hip Joint
- Designing Nanofibrous Scaffolds for Tissue Engineering

This textbook has a content that will be comfortingly familiar to most practicing biomaterial scientists, particularly those that attend SFB meetings. It is a well-balanced book about biomaterials because it covers classic biomaterials like bioactive glass, hydroxyapatite, and titanium alloys, while also providing chapters on contemporary and exciting areas such as nanobiomaterials, scaffolds for interface tissue engineering, and new polymeric materials. There are a couple of quirky chapters at the end of the book; such as, "Cells of the Nervous System and Electrical Stimulation", and "Placental Umbilical Cord Blood", that do not deal with biomaterials, but they do not detract from the book because they respectively provide some insight as to how electrical fields can guide the differentiation of neural progenitor cells, and the capability of cord blood as a source of multi-potent cells for regenerative purposes. Overall, this book meets its objectives and is recommended as a biomaterials textbook or a good addition to your personal library that can be readily loaned to students or colleagues from other disciplines seeking to know more about a particular type of biomaterial.

ATS Medical Inc. (Minneapolis, Minn.) received Food and Drug Administration approval to study its ATS 3f Aortic Bioprosthesis heart valve in unusually young patients. The company plans to test the product in patients younger than 60 who need an aortic valve replaced. Half the patients in the study will be under 50. The FDA approved the device in October. There are no age restrictions on that approval, but ATS said aortic valves have not been studied in younger, more active patients.

Cardinal Health (Dublin, Ohio), drug and medical supplies distributor, will spin off its medical device division, streamlining operations after more than a decade of diversified growth, a strategy which analysts say never quite panned out. Cardinal's medical technology division will begin operating as a separate company called Carefusion, containing nearly two dozen device businesses acquired since the mid-1990s. Carefusion's business focuses on drug infusion pumps, respiratory equipment and medication dispensing systems. The new company will be headquartered in San Diego, Calif. Carefusion represented less than 10 percent of Cardinal's revenue but nearly 40 percent of earnings.

EnteroMedics Inc. (St Paul, Minn.) said results from a pivotal clinical trial failed to meet key endpoints intended to prove its anti-obesity device was effective as a treatment to encourage weight loss. Failure to meet primary and secondary endpoints in the 294-patient study will derail the company's application to the Food and Drug Administration for approval to sell the Maestro obesity-fighting system in the United States. The ongoing detailed review suggests vagal blocking therapy may promote safe and effective weight loss as an adjunct to behavioral support, diet and exercise in morbidly obese patients.

Pico-Tesla Magnetic Therapies (Littleton, Colo.) announced it has commenced a Phase III clinical trial of its patented Resonator™ system facilitating the company's proprietary magnetic (Magneceutical™) therapy for treating Parkinson's disease patients. Magneceutical™ Therapy involves the use of an extremely low-level electromagnetic field applied by a specially designed device, the Resonator™, along with therapeutic protocols to improve a number of the signs and symptoms of Parkinson's and other neurological-based diseases.

Stryker Corp. (Kalamazoo, Mich.) has an agreement to acquire Ascent, a privately held medical device remanufacturer. The 900-employee company, which reprocesses and remanufactures cardiovascular, orthopedic, gastroenterology and general surgery devices for hospitals, is based in Phoenix, Ariz., and operates plants in Phoenix and in Lakeland, Fla. Ascent will be organized under Stryker's MedSurg group but remain a stand-alone company, serving 1,800 hospitals and group purchasing organizations in North America, remanufacturing.

Synthes Inc. (Switzerland) has won a key ruling in an ongoing U.S. patent case against U.S. competitor, Medtronic. The case, which began in 2007, concerned a patent covering Synthes' ProDisc-L artificial disc replacement device. The U.S. District Court in Memphis, Tenn., acknowledged Medtronic had infringed the patent and awarded the Swiss maker of nails, screws and bone plates \$21 million in damages, interest and costs.

Other News:

The House health reform bill seeks to impose roughly \$20 billion in taxes over the next decade on medical-device makers, approximately half the amount approved by the Senate Finance Committee.

Members in the News

Chapter News

Contributed from Press Release

Congratulations to:

Dr. Tony Mikos, Louis Calder Professor of Bioengineering at Rice University, who has been elected a Fellow of the Biomedical Engineering Society. BMES Fellow status is awarded to Society members who demonstrate "exceptional achievements and experience in the field of biomedical engineering."

Dr. Nicholas Peppas, University of Texas-Austin Chairman and Fletcher Pratt Chaired Professor of Biomedical Engineering, Chemical Engineering and Pharmacy, who is the recipient of the 2010 Distinguished Scientist Award from the Southeastern Universities Research Association (SURA). Dr. Peppas is being honored for pioneering contributions to

biomedical engineering, biomaterials, polymer sciences and drug delivery. The award will be presented to him at the SURA Board of Trustees meeting at Duke University.

Dr. Thomas Webster, SFB Web Editor and Associate Professor of the Divisions of Engineering and Orthopedic Surgery at Brown University, whose research team received the 2010 Citation Award from the Society of Critical Care Medicine. Dr. Webster and team demonstrated bacterial infection can be reduced on catheters and endotracheal tubes by implementing nanoscale surface features, thus reducing or eliminating the need for anti-bacterial drug therapy.

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

Society For Biomaterials
2010 ANNUAL MEETING & EXPOSITION

Where Materials Meet Biology



Society For
Biomaterials
Giving life to a world of materials

Washington State
Convention Center

Seattle, Washington

April 21-24, 2010