

SFB OFFICER NOMINEES, SFB AWARDEES

UPDATES FROM THE NANO AND TISSUE ENGINEERING SIG

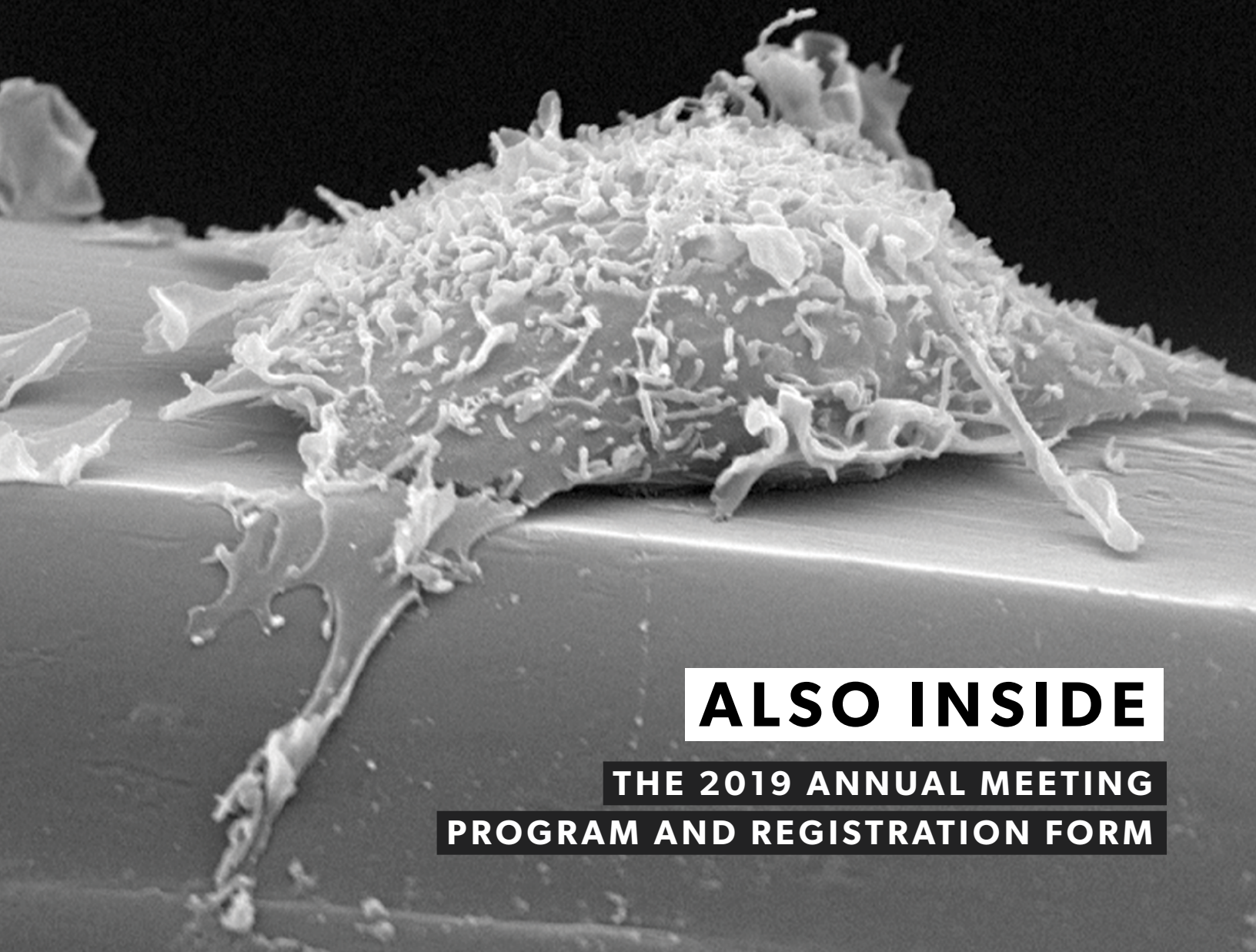
BIOMATERIALS

FORUM



OFFICIAL NEWSLETTER OF THE SOCIETY FOR BIOMATERIALS

FIRST QUARTER 2019 • VOLUME 41, ISSUE 1



ALSO INSIDE

THE 2019 ANNUAL MEETING

PROGRAM AND REGISTRATION FORM

BIOMATERIALS FORUM!

The official news magazine of the **SOCIETY FOR BIOMATERIALS** • Volume 41, Issue 1

Biomaterials Forum, the official news magazine of the Society For Biomaterials, is published quarterly to serve the biomaterials community. Society members receive *Biomaterials Forum* as a benefit of membership. Non-members may subscribe to the magazine at the annual rate of \$48. For subscription information or membership inquiries, contact the Membership Department at the Society office (email: info@biomaterials.org) or visit the Society's website, biomaterials.org.

It is the policy of the Society For Biomaterials that all articles reflect only the views of the authors. Publication of articles or advertisements within *Biomaterials Forum* does not constitute endorsement by the Society or its agents of products, services or views expressed herein. No representation is made to the accuracy hereof, and the publication is printed subject to errors and omissions. Articles that do not have an author byline may originate from press releases. The Society For Biomaterials retains press releases on file for a period of one year from the date of publication.

Editorial contributions to *Biomaterials Forum* are always welcome. Contributions should be sent to the executive editor and are subject to the terms and conditions of the Editorial and Publication Release. Authors should refer to the Author Guidelines, which are available on the Society's website, when writing submissions. The publisher accepts no responsibility for return or safety of artwork, photographs or manuscripts. Submission of editorial content does not guarantee acceptance or publication.

Address corrections should be sent to *Biomaterials Forum*, 1120 Route 73, Suite 200, Mt. Laurel, NJ 08054.

Requests for advertising information should be directed to Amy Chezem at achezem@ahredchair.com or 856-439-0500. Information is also available on the Society's website, biomaterials.org.

Unauthorized reproduction of this magazine in whole or in part is prohibited without the permission of the publisher. Requests for permission should be directed to the managing editor.

Scientific photos may be submitted for cover consideration in future issues. Submit color photo, no larger than 4" x 6", along with credit information and scientific description, to the executive editor.

Copyright© 2019 • ISSN 1527-6031
Society For Biomaterials
All rights reserved

Executive Editor Guigen Zhang, University of Kentucky
Phone: 859 323-7217 • Fax: 859 257-1856
guigen.bme@uky.edu

Managing Editor Amy Chezem, Society For Biomaterials
1120 Route 73, Suite 200, Mt. Laurel, NJ 08054
Phone: 856-439-0500 • Fax: 856-439-0525
Email: achezem@ahredchair.com

**Government News
Contributing Editor** Carl G. Simon Jr., NIST
Biosystems & Biomaterials Division
Email: carl.simon@nist.gov

News Contributing Editor Steve T. Lin, Exactech Inc.
Email: steve@exac.com

**Society Business & Membership
News Contributing Editor** Rebecca Carrier, Northeastern University
Chemical Engineering
Email: Rebecca@coe.neu.edu

**Special Interest Group News
Contributing Editor** Sarah Stabenfeldt, Arizona State University
sarah.stabenfeldt@asu.edu

Book Review Editor Lynne Jones, Johns Hopkins University
Department of Orthopaedic Surgery
Email: ljones3@jhmi.edu

**AIMBE News
Contributing Editor** Lynne Jones, Johns Hopkins University
Department of Orthopaedic Surgery
Email: ljones3@jhmi.edu

**Education News
Contributing Editor** C. LaShan Simpson, Ph.D., Mississippi State University
Agricultural and Biological Engineering
clsimpson@abe.msstate.edu

Historical Flashback Editor Guigen Zhang, University of Kentucky
Email: guigen.bme@uky.edu

Student News Contributing Editor Margaret Fettis, PhD Student, University of Florida
Email: mfettis@ufl.edu

SPECIAL INTEREST GROUP REPORTERS

**Biomaterials & Medical Products
Commercialization** Puneeth Shridhar • pus8@pitt.edu

Biomaterials Education Sarah Rowlinson • sarcorow@gmail.com

Biomaterial-Tissue Interaction Antonio Merolli • antonio.merolli@rutgers.edu

Cardiovascular Biomaterials Rami Tzafiriri • rtzafiriri@cbset.org

Dental/Craniofacial Biomaterials Scott A. Guelcher • scott.guelcher@vanderbilt.edu

Drug Delivery Brent Vernon • brent.vernon@asu.edu

Engineering Cells & Their Microenvironments Daniel Alge • dalge@bme.tamu.edu

Immune Engineering Jai Rudra • jarudra@utmb.edu

Nanomaterials Eno Ebong • e.bong@northeastern.edu

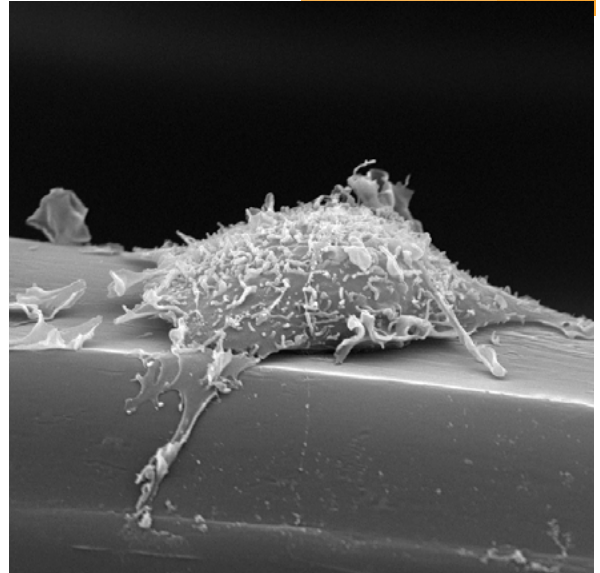
Ophthalmic Biomaterials Yasushi Kato • ypkato@innovia-llc.com

Orthopaedic Biomaterials Roche C. de Guzman • roche.c.deguzman@hosftra.edu

Protein & Cells at Interfaces Rafael Ramos • ramos.rafael93@gmail.com

Surface Characterization & Modifications Gopinath Mani • gmani@sjm.com

Tissue Engineering Shilpa Sant • shs149@pitt.edu



ON THE COVER

The cover image, provided by Xiaoqi Tang of Prof. Martin W. King's lab in the Department of Textiles Engineering at North Carolina State University, shows 3D growth of a 3T3 cell on PET fibers. The cell appears like a ladybug.

Contents

THE TORCH

- 2 FROM THE EDITOR
- 3 FROM THE PRESIDENT
- 8 2019 SFB AWARD RECIPIENTS
- 14 2019 SFB OFFICER NOMINEES

NEWS & UPDATES

- 4 MEMBER NEWS
- 6 STAFF UPDATE
- 7 STUDENT CHAPTER NEWS
- 20 ANNUAL MEETING REGISTRATION BROCHURE
- 32 NANOMATERIALS SIG UPDATE
- 35 TISSUE ENGINEERING SIG UPDATE
- 37 INDUSTRY NEWS
- 39 COULD GRANT LOTTERIES SOLVE THE MESS FOR SCIENCE FUNDING?
- 41 BOOK REVIEW

SPECIAL INSERT:
Annual Meeting
Registration Brochure

PAGE 20!

From the Editor

By Guigen Zhang, Editor, SFB Forum



TO THE FAMILY!

The 2018 college football season just ended, and it ended with the Clemson Tigers winning another National Championship and eating burgers and fries in the White House. Go Tigers!

Though I am not seriously following all games, I have to say I'm continually intrigued by reactions to decisions made by the Selection Committee every year in picking the top four teams for the championship playoff. This year, when Alabama, Clemson, Notre Dame and Oklahoma were declared as the top four teams, the reactions were furious as always, to say the least. Among the arguments was one that Georgia should have been given a slot, based on the statistics of every game these teams had played this season. Only when Georgia was defeated by Texas in the 2018 Sugar Bowl did such debates subside.

Okay, what really intrigued me was why there are still many people out there who believe in the reliability of using statistical data to predict the performance of teams of players. A group of people is not a linear superposition of multiple individuals. Instead, it is a nonlinear dynamical system. To make matters worse, in such a system, all individuals have their own hearts and minds.

As Stephen J. Guastello stated in *Managing Emergent Phenomena: Nonlinear Dynamics in Work Organizations*: "Our understanding of social groups and organizations has progressed by gradual increments over the last century and then, suddenly, there was a very different theory — one that emphasizes the footprints of change and the many shapes and sizes that could be. Nonlinear dynamical systems theory, which is also known colloquially as chaos theory or complexity theory, is the study of the events over time and space. By 'nonlinear' we are calling attention to the uneven change of events over time, and the disproportionate responses that systems make when we try to affect or control them in some manner. Sometimes a small intervention has a dramatic impact. Sometimes a large plan accomplishes very little."

A nonlinear dynamical system is describable by chaos theory. Chaos theory, according to Wikipedia, deals with the behavior of [dynamical systems](#) that are highly sensitive to [initial conditions](#). Such behavior is complex and hard to predict, just like a butterfly flapping its wings in Brazil causing a hurricane in Texas, as dramatized by Edward Lorenz when he coined the term "butterfly effect" to describe the chaotic phenomena of a small change in the initial condition having different, unpredictable outcomes.

Well, can we still sort out any connections between chaos and order? As Ilya Prigogine, whose insight into the relationship between order and chaos won him the Nobel Prize in Chemistry

in 1977, put it in his 1997 book *The End of Certainty: Time, Chaos and the New Laws of Nature*: "The more we know about our universe, the more difficult it becomes to believe in determinism." But here Prigogine was talking about nonhuman phenomena of our universe.

When dealing with the human aspects of the universe, rational thinking aside, we need to consider the unpredictable behavior of things we call hearts and minds. I remember talking about the Houston Astros. The team has been known as the industry's most analytically driven organization, relying almost entirely on data assembled by in-house talent from the worlds of economics, physics and engineering. But this analytical system made every player a number instead of a person. The willingness by Astros' management to embrace the value of *chemistry* and *culture* paid enormous dividends in 2017: The Astros won the World Series, the team's first in more than 50 years.

It seems that Clemson's coaches know exactly how to motivate their players by working on their hearts and minds, in addition to the physical aspect of the game. No wonder that the Clemson team is regarded as a family and the Alabama team as a factory.

A FAMILY; sound familiar? From what I recall hearing from many SFB founding and lifelong members, SFB is also a family!

In closing, let me briefly tell you what we have prepared for you in this issue. Aside from hearing from the president and reading member, staff and student news, you will get caught up with updates from the Tissue Engineering SIG and Nanomaterials SIG. Since this is also the time for SFB to recognize its higher-achieving members, you will read about this year's numerous awardees. On the SFB organization front, it is our annual election "season," so we present you officer nominees and their visions for leading the Society forward. In our regular columns, you will read industry news, and book review. Book review Editor, Lynne Jones, invites the leadership of the Society and all members, to read chapters 23, 24, and 25 of the book she reviewed, Medical Innovation. Due to the government shutdown, Carl G. Simon, Jr., *Biomaterials* Government News Contributing Editor, will resume reporting when the shutdown ends. Finally, we bring to your attention, an interesting debate on whether or not funding scientific research should be decided by using a lottery system or choosing projects at random.

With best wishes,

Guigen Zhang

From the President

By Andres Garcia



DEAR SFB COLLEAGUES,

I hope that 2019 has been a good year so far.

This first quarter is the last of my presidency. It has truly been an honor to serve you, and I appreciate the opportunity. Many thanks to the members of the council and Board, Dan Lemyre and AH staff, and you for your support and contributions during the past year. I am confident that Horst will do a great job as our next president.

This has been a fantastic year for SFB, as demonstrated by the many impactful contributions from our members, Biomaterials Days meetings and the Annual Meeting in Atlanta. Our Society continues to thrive, and I am very proud of all our accomplishments.

Our efforts this year have focused on three key areas:

Increase Value to Members. We have worked to increase the value that the Society provides to our members as related to scientific excellence, educational and professional development, and broader societal impact. Gopinath Mani, William Murphy and the rest of the Program Committee have put together a scientifically stimulating and cutting-edge program for the upcoming meeting in Seattle (2019.biomaterials.org). Many thanks to program chairs, the Program Committee, Special Interest Groups, and session organizers and reviewers. The Annual Meeting will also provide ample opportunities for networking and professional development, including Career Catalysis and Industry tracks and social activities for young scientists, women and members from underrepresented minority and LGBTQ groups. We have created Listserv groups (sign up at the Annual Meeting registration page) to facilitate connectivity and social interactions at the meeting. We have improved the mentoring program to connect trainees with established investigators. This program provides a meaningful opportunity to prepare the next generation of leaders and contributors to our Society. We welcome new trainees and mentors; both can sign up here: biomaterials.org/students/mentor-program.

Foster Scientific Excellence and a Nurturing Environment. We have continued to support and expand local Biomaterials Days. These

events provide excellent opportunities for scientific exchanges and networking and further extend the impact and brand of our Society. Biomaterials Day events have been organized by the MidWest (Case Western Reserve University, University of Michigan Ann Arbor, Carnegie Mellon University, University of Pittsburgh), University of Florida, University of Washington, Texas Collaborative (Rice University, Texas A&M University, University of Texas at Austin, University of Texas Health Sciences, University of Texas at San Antonio), MidAtlantic (University of Maryland College Park, Johns Hopkins University, Penn State University), UC Davis, University of South Dakota and North Carolina State University student chapters. I thank the organizers for their hard work and for the success of these activities. We have also established a new post-doctoral travel award and added the Mid-Career Award to recognize the exceptional scientific, professional and service contributions of our members.

SFB affirms its obligation and commitment to foster and support a professional environment in which to carry out our mission, recognizing that failure to meet this obligation and commitment harms our profession, our professional credibility, the well-being of individuals and the broader communities in which we live and work. Accordingly, and to foster a positive environment, the SFB Board of Directors has issued this Volunteer/National Meeting Attendee Conduct Policy for all Society meetings and events: biomaterials.org/about-about-society/code-conduct.

Expand the Impact of SFB. A point of emphasis for this year has been to increase SFB's presence in social media to increase communication and networking among members and disseminate the broad impact and contributions of our Society. Please follow us on Twitter at @SFBiomaterials. We continue to work with other professional societies and advocacy groups to increase the broad impact of SFB.

In closing, our Society is a thriving and nurturing community at the forefront of scientific excellence and societal impact. I challenge and encourage each of you to be engaged in the diverse activities that we support and to continue enhancing and increasing our impact. I again thank you for all your contributions and for giving me the opportunity to serve our Society.

Member News

By Rebecca Carrier, Member-at-Large



I am honored to serve as your 2018-2019 Member-at-Large. I aim to work with you to give SFB membership a clear voice for SFB's direction, so together we can help SFB grow and maximize the value of your membership – please email me at r.carrier@northeastern.edu with any ideas and feedback you would like to share!

This quarter's exciting member news and accomplishments includes the following:

Nureddin Ashammakhi recently published an article in *Advanced Materials* entitled "Minimally Invasive and Regenerative Therapeutics." The article was chosen for the cover of the journal and written by a team of researchers, including SFB Member Ali Khademhosseini. Dr. Ashammakhi is Associate Director at Center for Minimally Invasive Therapeutics, and is currently an Adjunct Professor at the University of California, Los Angeles. He is working on translational and minimally invasive regenerative therapies.

Danielle Benoit was awarded the 2018 University of Maine Francis Crowe Distinguished Engineering Alumni Award for outstanding service to the field of engineering. Dr. Benoit is the James P. Wilmot Distinguished Associate Professor within the Department of Biomedical Engineering at the University of Rochester. Her research is focused on rational design of polymeric materials with applications in regenerative medicine and drug delivery. Dr. Benoit's work has made great strides in areas including: development of translational approaches for bone allograft repair; development of pH-responsive nanoparticles for small molecule and nucleic acid delivery; and novel targeting approaches for bone-specific therapeutic delivery.

Emily Day, Assistant Professor of Biomedical Engineering at the University of Delaware, was recently named the Mangone Young Scholar by the Francis Alison Society at the University of Delaware. Additionally, she received the 2018 Rita Schaffer Award from BMES. The Mangone Scholar Award recognizes the accomplishments of promising young faculty and is chosen by other faculty who have received the Francis Alison Award, which is the University of Delaware's highest competitive faculty honor. Dr. Day also received the Rita Schaffer Young Investigator Award from the Biomedical Engineering Society in October of 2018. Dr. Day studies nanomedicine, gene regulation, photothermal therapy and translational cancer research. For more information, see: (<https://www.udel.edu/udaily/2018/november/emily-day-young-scholar-awards-biomedical-engineering/>).

Ozgul Gok, Assistant Professor at the Department of Medical Engineering at Acibadem Mehmet Ali Aydinlar University, has received a travel grant for early career researchers, awarded by Nature Communications Chemistry. She is using the grant

to attend the Society for Biomaterials 2019 Annual Meeting in Seattle, in April 2019. Dr. Gok's research focuses upon the design of synthetic and natural biomaterials for drug delivery and tissue engineering. With this grant, she will have the opportunity to meet with the international community of academicians, industry scientists and clinicians at the Society for Biomaterials "pinnacle of biomaterials" annual meeting. For more information, please see: nature.com/commschem.

Adam Jakus recently shared that The Cooper Hewitt Design Museum (part of the Smithsonian) in New York City and The CUBE Design Museum in the Netherlands are putting together sister exhibitions entitled "NATURE". Part of this exhibit will include advanced 3D-Printed Biomaterials from Dimension Inx., a company recently founded by Dr. Jakus and Prof. Ramille Shah. The exhibitions will also include additional artistic pieces produced by Dr. Jakus as part of a separate art company based on the same advanced 3D-Printed Biomaterials. The exhibitions represent great opportunities for a broader audience to see and learn about biomaterials and the advances being made in the field. For more information, please see: <https://www.cooperhewitt.org/2018/11/15/cooper-hewitt-and-cube-design-museum-to-co-organize-2019-design-triennial/>

Jindřich Henry Kopeček, Distinguished Professor of Biomedical Engineering and Distinguished Professor of Pharmaceutics and Pharmaceutical Chemistry at the University of Utah was elected Fellow of the National Academy of Inventors. He was also elected International Fellow and received the T. & A. Higuchi Memorial Lectureship Award from the Academy of Pharmaceutical Science and Technology, Japan.

Robert Langer, the David H. Koch Institute Professor at the Massachusetts Institute of Technology (MIT), recently gave a lecture entitled "What I've Learned from Founding More Than 40 Startups" in Europe, at the Libera Università Internazionale degli Studi Sociali Guido Carli (LUISS). Dr. Langer was invited by the research magazine LUISS Open and the young entrepreneur section of the entrepreneurial association Confindustria to deliver the lecture on January 9, 2019.

Bingyun Li, SFB's Orthopedic Biomaterials SIG chair, has been invited to give a keynote lecture on "Immunotherapeutic approaches against infection" at the 2019 European Cells and Materials (eCM) Annual Conference. The conference will be held during June 26-28, 2019 at the Congress Center, Davos, Switzerland. Since the inaugural meeting in 1999, the eCM annual meetings have been a place where scientists and clinicians meet to develop projects that have a clinical focus and are translational in nature. Dr. Li has also been invited to serve as a senior editor of a special research topic on "Antimicrobials and Anticancers of Bacterial Origins." This special issue will be published in

Member News (continued)

2019 on *Frontiers in Microbiology* (a prestigious open access microbiology journal). Dr. Li is a Professor in Orthopaedics at West Virginia University and a faculty participant at the West Virginia Clinical and Translational Science Institute, and his research focuses on infection and advanced biomaterials. His research in bone infection has been recognized nationally and internationally, including the 2011 Berton Rahn Research Prize from AO Foundation (Switzerland), the 2013 Pfizer Best Scientific Paper Award from the Asia Pacific Orthopaedic Association Annual Meeting, and the 2013 Collaborative Exchange Award from the Orthopaedic Research Society.

Nicholas Peppas, the Cockrell Family Regents Chair in Engineering #6 and Professor of Chemical and Biomedical Engineering at the University of Texas at Austin was awarded the 2018 AAPS Distinguished Pharmaceutical Scientist Award and the Adam Yarmolinsky Medal from the National academy of Medicine. The AAPS Distinguished Pharmaceutical Scientist Award, sponsored by a grant from AstraZeneca, recognizes the accomplishments of an individual who has done outstanding work that has significantly moved the frontier of the field in the pharmaceutical sciences, regulatory and/or technology fields. Dr. Peppas was given the award on the basis of demonstrated continued effort in testing and establishing basic concepts of highly important scientific significance, and stimulation of research investigations by others. Professor Peppas is an internationally renowned scientist who, for four decades, has made profound contributions to the drug delivery field in the design of new pharmaceutical formulations and the oral delivery of drugs and therapeutic proteins. These contributions have led to the design, optimization, and commercialization of numerous products directly benefitting patients. For more information, see: <https://www.newswise.com/articles/aaps-announces-2018-distinguished-pharmaceutical-scientist-award-for-pioneering-work-in-protein-and-drug-transport-and-release-from-polymer-systems-2> and https://www.youtube.com/watch?v=_ZsUla65U58.

The Adam Yarmolinsky Medal is awarded to a member of the National Academy of Medicine (NAM) from a discipline outside the health and medical sciences to recognize distinguished service over a significant period of time towards the mission of the NAM. Dr. Peppas served on NAM Membership Committee from 2013-2017 and the Subcommittee on International Members from 2015-2016, working tirelessly to recruit and involve members from outside of health and medical sciences, such as chemical engineering and biophysics. He also served on various National Academies committees, including the Committee on Key Challenge Areas for Convergence and Health, Panel on Benchmarking the Research Competitiveness of the U.S. in Chemical Engineering, and the NSF Graduate Panel on Engineering. In addition to his excellence in research, Dr. Peppas is an engaging and effective educator, having mentored more than 230 graduate students and visiting scientists. His unique

ability to bring together researchers from disparate fields and his revolutionary research on biomedical and chemical engineering have had a tremendous and lasting impact on the NAM and the nation's scientific progress. For more information, see: <https://nam.edu/about-the-nam/adam-yarmolinsky-medal/> and <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=10152018a>.

Leonard Pinchuk, Distinguished Research Professor at the University of Miami, was one of 5 individuals selected to receive the 2019 Fritz J. and Dolores H. Russ Prize from the National Academy of Engineering (NAE), for innovations in medical devices that enable minimally invasive angioplasty treatment of advanced coronary artery disease. The Russ Prize recognizes an outstanding bioengineering achievement in widespread use that improves the human condition. This award is considered the highest recognition of NAE for medical/biological work. For more information, see: <https://www.nae.edu/Activities/Projects/Awards/RussPrize/RussWinners/2019Russ.aspx>.

Suzie Pun, the Robert F. Rushmer Professor of Bioengineering, is among 14 UW faculty elected to the Washington State Academy of Sciences in 2018. These members were selected for "their outstanding record of scientific achievement and willingness to work on behalf of the academy in bringing the best available science to bear on issues within the state of Washington." The academy's mission is "to provide expert scientific and engineering analysis to inform public policymaking in Washington, and to increase the role and visibility of science in the state." Dr. Pun will be formally inducted at the organization's annual meeting at the Museum of Flight in Seattle. Dr. Pun's research focuses on developing bioinspired materials for medical applications. Her lab is developing door-opening technologies in drug delivery, innovations for macromolecule delivery to the central nervous system, injectable hemostatic polymers and materials for controlled modulation of the immune system for cancer treatment. For more information, see: <https://bioe.uw.edu/suzie-pun-elected-to-washington-state-academy-of-sciences-2018/>.

Thomas Webster, Professor and Department Chair of Chemical Engineering at Northeastern University, was recently named an Overseas Fellow to the Royal Society of Medicine of the United Kingdom. Fellows of The Royal Society of Medicine represent physicians or scientists who are elected following nomination and review. The Society "provides a neutral platform for informed debate about important, often controversial, healthcare topics." Former Fellows include Charles Darwin, Louis Pasteur, Edward Jenner and Sigmund Freud. Election to The Royal Society of Medicine is considered comparable to membership in the National Academy of Medicine in the United States.

Staff Update

By Pam Gleason, Assistant Executive Director

Greetings from Society For Biomaterials headquarters! As we begin 2019, the Society's Board of Directors, governing council, committees, task forces and Special Interest Groups (SIGs) are looking forward to the upcoming Annual Meeting.

BOARD/COUNCIL

President, Andrés García, PhD

Andrés García thanks the Board, council and members of CRS who continue to make the Society successful.

AWARDS, CEREMONIES AND NOMINATIONS COMMITTEE

Chair: Thomas Webster, PhD

The Awards, Ceremonies and Nominations Committee has chosen and notified 2019 award recipients. (The full article can be found in this issue of *Biomaterials Forum*.) Thank you to all who nominated, and please start thinking about possible nominations for next year — especially for president-elect and member-at-large. The 2019 – 2020 (2021) election website is open; please remember to vote!

BYLAWS COMMITTEE

Chair: Ben Keselowsky, PhD

The Bylaws Committee continues to monitor the Society's operations and strategic direction to determine if bylaw amendments may be necessary.

EDUCATION & PROFESSIONAL DEVELOPMENT COMMITTEE

Chair: Jan Stegemann, PhD

The Education & Professional Development Committee is looking forward to the many Biomaterials Days scheduled for 2019, as well as the Young Scientist Career Catalysis Group's interactive challenges at the Annual Meeting to engage young scientists.

FINANCE COMMITTEE

Chair: Elizabeth Cosgriff-Hernandez, PhD

The Society is in line with income and expense projections and has a positive operational net income. SFB is preparing the 2019 budget, and the Finance Committee has made recommendations to the Board for continued growth. Please continue your support by booking your accommodations for the 2019 Annual Meeting at the headquarters hotel.

INDUSTRIAL AFFAIRS COMMITTEE

Chair: Peter Edelman, PhD

The Industrial Affairs Committee has developed interesting content for the Annual Meeting and is looking forward to attending these sessions.

MEMBERSHIP COMMITTEE

Anirban Sen Gupta, PhD

Current membership stands at 1,422 with 709 active members, 101 post-grad members, 49 retired members and 563 student members. Membership continues to trend upward; at this time last year, we had 1,391 members (and 1,055 in 2017). The Membership Committee continues to move forward with offering industry membership subscription packages, which we plan to roll out during the 2019 membership year. The committee also plans to survey lapsed members with the intention of re-engaging them with the Society, as well as to develop a retention plan to use moving forward.

PRESIDENT'S ADVISORY COMMITTEE

David Kohn, PhD

The President's Advisory Committee is finalizing a code of ethics for the Society based on principles of ethical conduct, honesty, integrity, fairness and equity that we believe every biomaterials scientist and engineer should adhere to. The committee is also compiling a list of contacts that could potentially expand the pool of sponsors for the Annual Meeting.

PROGRAM COMMITTEE

Chairs: Gopinath Mani, PhD, and William Murphy, PhD

Planning for the 2019 Annual Meeting taking place in Seattle, Washington, from April 3 – 6, 2019, is well under way, and the committee is looking forward to an excellent meeting.

SIGS

Representative: Sarah Stabenfeldt, PhD

Happy new year! SIGs had a very active 2018, with contributions to the 2019 Annual Meeting programming, budget proposal submissions and SIG officer nominations. Keep an eye out for SIG officer ballots in the coming months.

If you have any questions,

need any information or have suggestions for improved services, please feel free to contact the Society's Headquarters office:

SOCIETY FOR BIOMATERIALS
1120 Route 73, Suite 200 • Mount Laurel, NJ 08054
Phone: 856-439-0826 • Fax: 856-439-0525
Email: info@biomaterials.org • URL: biomaterials.org

Student Chapter News

YES, OUTREACH MATTERS!

By Margaret Fettis, Student Chapter President



Outreach activities facilitate discussion and immersion into topics that the general public does not readily have access to. Sharing our research with the general public is imperative to moving science forward. Community members have a voting voice for science policy, and public opinion can drive which research actually happens. My first engineering experience was through a local university during a Women in STEM outreach event. I was only in junior high, but I was given the opportunity to participate in a collaborative engineering-based activity and toured a few engineering labs. As graduate students, we may scoff at taking valuable time away from research to show a few younger students around a lab. However, I cannot put into words how much being exposed to an academic lab and observing very simple biomaterial research affected my excitement for studying engineering and biomaterials.

MAKE THE TIME. OUTREACH MATTERS.

As a graduate student, it is difficult to find time to develop and facilitate outreach activities. Outreach is important. Work with other students to collaboratively design activities. It's very easy to forget how cool electrophoresis can be or how exciting alginate microspheres once were. After seeing how excited and inquisitive young students are during outreach activities, I feel rejuvenated and motivated to get back to my research. Engaging with the community reminds us that we are working on exciting, meaningful science.

INCLUDE THE ENGINEERING METHOD OR THE SCIENTIFIC METHOD

The engineering method and scientific method provide clear-cut steps for designing an experiment or engineering an idea. Many students are exposed to the scientific method already, so connecting "hypothesis" and "analysis" to your activities reinforces what they learn in the classroom. Introducing the engineering method is another tactic to provide structure to your outreach activities. The steps of the engineering method parallel the scientific method, so students already exposed to the scientific method can easily connect with the engineering method. Introducing this step-by-step design process makes engineering seem more accessible and allows students to picture themselves as engineers or researchers.

MEASURE AND EVALUATE OUTCOMES TO OPTIMIZE YOUR ACTIVITY

Before you start facilitating outreach, think of ways you can measure progress with before and after activities. Consider incorporating before and after assessments to directly measure

the value of your activities or presentations to students. Further, consider working with your principal investigator or other organizations on campus to get approval (i.e., your institutional review board) to administer surveys. This approval will allow you to collect outcomes or other data about the students participating in outreach with the intent to publish these outcomes or activities. Not only does publishing your activity and outcomes disseminate your outreach to others, but it also serves as an important metric you can include in your resume.

OUTREACH IS IMPORTANT FOR APPLICATIONS AND AWARDS

Lastly, if you need any external motivation to participate in outreach events, remember that many award and grant applications encourage and require outreach components. The National Science Foundation's Graduate Research Fellowship Program has an entire scored section on broader impacts. Participating in meaningful outreach is an excellent way to help get your application score in the fundable range.

I ENCOURAGE ALL STUDENT CHAPTERS TO PARTICIPATE IN THE EDUCATION CHALLENGE!

Participating in this challenge allows you to gain recognition for your outreach efforts and can act as a means to assess and improve your current activities. For more information, visit 2019.biomaterials.org/biomaterials-education-challenge.

SEE YOU AT THE SFB ANNUAL MEETING IN APRIL!

Below are some events geared toward students and young scientists

**Please see the final Annual Meeting agenda for any updates in scheduling!*

- Young Scientists Happy Hour and Trivia Game Night: Thursday, April 4, 8 – 9 pm
- Student Luncheon: Friday, April 5, 12:30 – 1:45 pm
- National Student Chapter Meeting: Friday, April 5, 5:15 – 6:15 pm

Sign up for the Young Scientist Group mailing list on the 2019 Annual Meeting registration page to receive updates about Annual Meeting activities.

2019 SFB Award Recipients

The following professionals are recognized for their outstanding achievements in and contributions to the biomaterials field. Each award recipient will be honored during the Opening Ceremony at the Society For Biomaterials Annual Meeting in Seattle, Washington, on April 3, 2019.

FOUNDERS AWARD

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



Joachim Kohn, PhD

Rutgers University

Dr. Joachim Kohn, widely recognized as a leader in biomaterials science, is the Board of Governors Professor of Chemistry and Chemical Biology at Rutgers University. He has served as director of the New Jersey

Center for Biomaterials since its establishment in 1997. He is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE) and of the International Union of Societies for Biomaterials Science and Engineering. He is the principal investigator of several leading federally funded R&D programs: a National Institutes of Health (NIH)-funded post-doctoral training program in tissue engineering, a National Science Foundation (NSF)-funded Partnership for Innovation designed to explore new plant-synthetic hybrid biomaterials, the NIH-funded National Resource for Polymeric Biomaterials and the Department of Defense (DoD)-funded Center for Military Biomaterials Research. As one of two principal investigators of the Armed Forces Institute of Regenerative Medicine, he guided the efforts of more than 100 scientists and clinicians located in 15 institutions across the nation. Prof. Kohn's research interests focus on the development of new biomaterials. He pioneered the use of combinatorial and computational methods for the optimization of biomaterials for specific medical applications. He is mostly known for his seminal work on "pseudo-poly (amino acids)," a new class of polymers that combines the nontoxicity of individual amino acids with the strength and process ability of high-quality engineering plastics. U.S. Food and Drug Administration (FDA)-approved medical devices using these materials have been implanted in more than 30,000 patients.

AWARD RECIPIENTS WILL BE HONORED DURING THE OPENING CEREMONY AT THE SOCIETY FOR BIOMATERIALS ANNUAL MEETING IN SEATTLE, WASHINGTON ON APRIL 3, 2019. LEARN MORE ABOUT THEIR ACHIEVEMENTS BY ATTENDING THE MEETING.

CLEMSON AWARD FOR APPLIED RESEARCH

This award is given for the development of a useful device or material that has achieved widespread usage or acceptance or expanded knowledge of biomaterials/host tissue relationships that have received widespread acceptance and resulted in improvements in the clinical management of disease.



Christine E. Schmidt, PhD

University of Florida

Dr. Christine Schmidt is the J. Crayton Pruitt Family Chair and Chair of Biomedical Engineering at the University of Florida. Dr. Schmidt's research is focused on engineering novel materials and therapeutic systems to

stimulate damaged peripheral and spinal neurons to regenerate. Taking a unique approach to this problem, she uses electronically conducting polymers and natural-based materials (e.g., hyaluronic acid-based biomaterials, decellularized tissues) to create therapies that can electrically, chemically, biologically and mechanically trigger neurons at both the macroscopic and nanometer scales. She is a Fellow of the National Academy of Inventors, the American Association for the Advancement of Science (AAAS), Biomaterials Science and Engineering, the Biomedical Engineering Society and AIMBE. She is also currently president of AIMBE.

CLEMSON AWARD FOR BASIC RESEARCH

This award is given for contributions to the basic knowledge and understanding of the interaction of materials with tissue. The contribution may employ a new theoretical concept, new material development or original study of the functioning or interactions of a material in the biological environment. The contribution will be evidenced by significant research, important publications in the literature and/or frequent reference to and reliance on this work by subsequent researchers.



Paulette Spencer, DDS, PhD

University of Kansas

Dr. Paulette Spencer, Deane E. Ackers Distinguished Professor of Mechanical Engineering and the director of the Institute for Bioengineering Research (IBER) at the University of Kansas, is among the pioneers

in the development of nondestructive techniques for in situ characterization of structure/property relationships at material/tissue interfaces. Dr. Spencer's research is represented in more than 190 publications, 50 invited presentations, more than 8,000 citations and an h-index of 55. In 2017, she co-edited a book titled *Material-Tissue Interfacial Phenomena*. Building on her education and experience, she leads a research program that is driven by clinical need and integrates engineering principles

2019 SFB Award Recipients (continued)

with clinical practice. She has developed a unique research program based on “practice-inspired advances in understanding tissue–material interfaces” to drive biomaterials discovery. It has been recognized for decades that the failure of reconstructed tissues and joints using synthetic or tissue-engineered materials starts at the interface. Despite this history, mechanistic evaluation of interfacial failure remains limited. Dr. Spencer’s research team uses multiscale structure/property imaging and modeling to provide insight into the mechanistic behavior of reconstructed tissue/material interfaces. The experimental tools are state of the art, while the modeling and analytical techniques bridge scales from molecules to meters. Unique capabilities for understanding biomaterials, tissues and biomaterial/tissue interfaces are brought together in the IBER, and knowledge of interfacial phenomena is used to rationally design and develop new biomaterials and medical devices. Dr. Spencer is a member of the Society for Applied Spectroscopy, the American Dental Association and AAAS.

CLEMSON AWARD FOR CONTRIBUTIONS TO THE LITERATURE

This award is given for significant contributions to the literature on the science or technology of biomaterials. The importance of the contributions is evidenced by systematic publications in technical journals, significant critical analyses and/or reviews, frequent citations and referencing of the contributions by independent writers, and/or the publication of major works such as monographs, textbooks, bibliographies and edited communications.



Balaji Narasimhan, PhD

Iowa State University

Dr. Balaji Narasimhan is the Anson Marston Distinguished Professor and Vlasta Klima Balloun Chair of Chemical and Biological Engineering and director of the Nanovaccine Institute at Iowa State University. The

Nanovaccine Institute, a consortium of 50 researchers at 17 universities, research institutes, national laboratories, companies and healthcare coalitions, is coordinated by Iowa State University, with its primary research of developing nanovaccines and nanotherapeutics that could revolutionize the prevention and treatment of diseases, including respiratory infections, neural disorders, tropical diseases, cancer and veterinary diseases. The novel “pathogen-mimicking” nanovaccines the group is developing are expected to revolutionize the ability to prevent viral and bacterial diseases. The research is an interdisciplinary merger of expertise in immunology, nanotechnology, materials science, microbiology, neuroscience, cancer biology, clinical science and social science. Dr. Narasimhan has spent more than a decade developing his science for medical applications with a bench-to-bedside approach.

C. WILLIAM HALL AWARD

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



Peter Edelman, PhD

Boston Scientific

Dr. Peter Edelman is manager, principal scientist and Fellow at Boston Scientific. Dr. Edelman has done important work in the diagnostic and therapeutic industries with biodegradable hydrogels, making advances in lab-on-a-chip medical diagnostic devices as well as developing innovative nanostring technology for molecular identification. He has been on teams that developed a next-generation platform technology for the emergency room and bedside monitoring of blood gases and electrolytes, implantable hydrogels, DNA microarrays and therapeutic ultrasounds. He is currently active in heart disease therapies, microsphere technology and the improvement of lubricated catheters and wires.

SOCIETY FOR BIOMATERIALS AWARD FOR SERVICE

The Society For Biomaterials Award for Service is presented to an individual or corporate or government entity that has provided significant service to the Society by establishing, developing, maintaining and promoting its objectives and goals.



James Anderson, MD, PhD

Case Western Reserve University

Dr. James Anderson, a Distinguished Professor at Case Western Reserve University, has worked in biomaterials, medical devices and prostheses for more than 40 years. His current activities range from clinical pathology evaluation of retrieved implants from humans to fundamental studies of cellular interactions with biomaterials. Dr. Anderson is long-time member of the Society For Biomaterials and has been the editor-in-chief of the *Journal of Biomedical Materials Research* for 30 years. He is also the recipient of the Elsevier Biomaterials Gold Medal Award and the *Acta Biomaterialia* Gold Medal. He is a consultant to the NIH Artificial Heart Program, the FDA and the International Standards Organization (ISO), where he is co-chair of Working Group 1 for the development of the ISO Standard on Biological Evaluation of Medical Devices (ISO 10993). He was elected to the Institute of Medicine of the National Academies of Science, the American Association of Physicians and the National Academy of Engineering, and he is a Fellow of AAAS.

2019 SFB Award Recipients (continued)

TECHNOLOGY, INNOVATION & DEVELOPMENT AWARD

The Technology, Innovation & Development Award recognizes an individual or team who provided key scientific and technical innovation and leadership in a novel product in which biomaterials played an important and enabling role. The award was developed to acknowledge novel breakthrough products as well as products that are significant improvements over state-of-the-art.



Ann Beal Salamone, MS

Rochal Industries

Ann Beal Salamone, president of Rochal Industries, has been a polymer/biomaterials scientist for more than 30 years, developing products for healthcare and personal care, flexible circuit boards and integrated chips.

She is one of the principal inventors of Rochal's liquid bandages for skin and wound treatment. Her products have generated approximately \$0.5 billion in sales. She holds 27 U.S. patents and patent applications. She is a past chairman of the American Chemical Society, Division of Polymer Chemistry. In 2009, she was selected as an Inaugural Fellow of the American Chemical Society, and in 2011, she received a nationally recognized LEAD Award from the Healthcare Businesswomen's Association. Ann Beal Salamone has served as president or vice president of the Enterprise Development Corporation (EDC), a South Florida science and technology incubator. During her tenure, EDC's clients increased aggregate revenues by more than \$98 million, raised more than \$74 million in outside funding, created 5,013 jobs, produced annual salaries of \$109.5 million and provided \$5.6 million in annual sales tax revenues. During this time, she was a Crystal Slipper Awardee and Executive Woman of the Year (2002) in recognition of her accomplishments at EDC and her contributions to national K-12 science education.

MID-CAREER AWARD

The Mid-Career Award recognizes an individual SFB member who has demonstrated outstanding achievements in and/or contributions to the field of biomaterials research.



Edward Botchwey, PhD

Georgia Institute of Technology and Emory University

Dr. Edward Botchwey is currently an associate professor in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University. Dr. Botchwey's research has focused on developing immunologically smarter biomaterials for regenerative engineering and medicine. Most recently, he has also focused on discovering novel treatments for sickle cell

disease pathologies and developing new omics technologies for therapeutic cell characterization and biomanufacturing. Dr. Botchwey has published more than 60 peer-reviewed research papers, and his work has been supported by a broad range of funding mechanisms, including governmental agencies such as NIH, NSF, AHA and DoD, as well as translational research funded by the Coulter Program, JDRF and industry sponsorships. Dr. Botchwey has been inducted into the College of Fellows of AIMBE and has received the NIH Presidential Early Career Award for Scientists and Engineers and the NIH Mentored Research Scientist Career Development Award. Dr. Botchwey has served as chair for the Gordon Research Conference on Biomaterials & Tissue Engineering and the Materials Research Society. He currently serves on the SFB Education & Professional Development Committee as well as on the editorial boards of the *Journal of Biomedical Materials Research Part A* and *ACS Biomaterials Science & Engineering*.

OUTSTANDING RESEARCH BY A HOSPITAL INTERN, RESIDENT OR CLINICAL FELLOW AWARD

This award is specifically geared toward hospital interns, residents, clinical fellows, medical students or individuals in equivalent positions who have shown outstanding achievement in biomaterials.



Alexander Tatara, MD, PhD

Massachusetts General Hospital

Dr. Alexander Tatara is a physician scientist committed to using his background in biomaterials to combat infectious diseases. His studies in the pathophysiology of cutaneous fungal infection led to his development of a novel library of biodegradable polymers as well as cutaneous aspergillosis, a deadly infection in cancer patients. Building from literature showing antifungal efficacy of terminal diols, he synthesized polymers of diols and dicarboxylic acids. Dr. Tatara has demonstrated that by altering factors such as the length of the terminal diol or the type of dicarboxylic acid, polymers of different physicochemical properties could be generated. These studies have resulted in publications in *Biomacromolecules*, *Medicine* and *Clinical Infectious Diseases*. In this submitted work, Dr. Tatara has both created a new animal model of cutaneous fungal disease and demonstrated that local drug delivery is an exciting avenue for treating invasive fungal infections by leveraging poly (diol fumarate) as a microparticle-based delivery vehicle. In his work to combat fungal disease, he has made contributions from basic science, translational and clinical perspectives. Dr. Tatara has also generated other animal models for the study of fungal disease (such as zebrafish), made

2019 SFB Award Recipients (continued)

contributions to our understanding of the effects of HMG-CoA reductase inhibitors on fungal virulence, and has improved on the use of bone cements for treating periprosthetic fungal infection. In addition, he has worked extensively in designing and implementing in vivo bioreactors in large animal models for the treatment of tissue defects. His contributions to the field include 27 peer-reviewed publications (17 as first author), 28 presentations at national or international conferences (eight as oral presentations), one book chapter and one patent. His passion and drive support his continuance to stand out and become a leader in translating engineering principles to improve healthcare outcomes in his patients.

YOUNG INVESTIGATOR AWARD

The Young Investigator Award recognizes an individual who has demonstrated outstanding achievements in the field of biomaterials research.



Stephanie Seidlits, PhD

University of California, Los Angeles

Dr. Seidlits' cross-disciplinary, integrated approach to research has continued to contribute to her success through completion of her PhD studies, as a post-doctoral researcher and now as an assistant professor

of bioengineering at the University of California, Los Angeles. Dr. Seidlits has published on a wide variety of strategies aimed at integrating biomaterial scaffolds with CNS cells and tissues, including a method for 3D, "direct-write" of protein-based nanostructures into hydrogel materials for neurite guidance (*Advanced Functional Materials* 2009; *J Materials Chemistry B* 2016), poly-lactic-co-glycolide-based scaffolds for in situ gene delivery to the injured spinal cord (*J Neuroscience Methods* 2016; *Bioengineering & Translational Medicine* 2016), hyaluronic acid-based hydrogels for spinal cord regeneration (*J Neural Engineering* 2011; *Cells Tissues* 2016) and hyaluronic acid-based hydrogels for 3D culture of CNS cells (*Biomaterials* 2010; *Advanced Materials* 2018). Her most recent publication in this area (*Advanced Materials* 2018) describes functionalization of hyaluronic acid hydrogels with magnetic nanoparticles and their ability to modulate firing of rodent dorsal root ganglia neurons in culture through activation of PIEZO receptors. This work was highlighted in a recent issue of *Science Translational Medicine* (*J Holloway* 2018). Dr. Seidlits' lab has published on a wide variety of strategies aimed at integrating biomaterial scaffolds with CNS cells and tissues, with independent tunability of hyaluronic acid content, mechanical properties, inclusion of integrin-binding peptides and scaffold permeability, which will enable systematic optimization of hydrogel scaffolds for various applications, including as models of human disease (*Cancer Research* 2018) and scaffolds for NS/PC culture and spinal cord regeneration.

STUDENT AWARD FOR OUTSTANDING RESEARCH, PHD CANDIDATE

The Student Awards for Outstanding Research recognize individuals who have demonstrated outstanding achievements in the field of biomaterials research.



Priyadarshini Singha

University of Georgia

Priyadarshini Singha's research focuses on the development of medical device materials that are antifouling, antithrombotic and antimicrobial and that can, in turn, improve the quality of a patient's hospital stay. Ms.

Singha has been able to design, lead and manage a project that focuses on the tremendous potential of nitric oxide. Nitric oxide is a potent antimicrobial and antithrombotic agent, and she has developed a broad-spectrum hybrid solution combined with cerium oxide nanoparticles that would provide the therapeutic effects of nitric oxide along with a cerium oxide nanoparticle's fungicidal property. In the project, she specifically worked on the design and synthesis of the synergistic antimicrobial solution, along with the chemical characterization (nitric oxide release) and biological characterization (antimicrobial assessment) of the material. These major contributions led her to becoming the main contributor and scientist for the project. The broad-spectrum antimicrobial solution formulated by this project would be applicable to any implantable medical device, including urinary catheters, vascular catheters and coronary stents, thus providing a wide scope of applications for higher-quality healthcare for patients.

STUDENT AWARD FOR OUTSTANDING RESEARCH, PHD CANDIDATE



Kathryn Wofford

Drexel University

Kathryn Wofford's innovative research investigates the intersections of biomaterials, immunology and neurology. Specifically, her master's research focused on fabricating and characterizing drug-loaded nanoparticles

before administering these anti-inflammatory particles to the injured spinal cord. More recently, her doctoral research is focused on using drug-loaded microparticles to redirect immune cell behavior following traumatic brain injury. Ms. Wofford's innovative biomaterial approach to modulating immune cell behavior in the brain is so unique that it has resulted in submission of a national patent, the Koerner Family Award for Graduate Students and the Interdisciplinary Collaboration and Research Excellence Fellowship at Drexel University. Importantly, her research on biomaterials, immunology and

2019 SFB Award Recipients (continued)

neuroinflammation has been productive, thorough and systematic. She independently devised a project focused on designing a novel drug delivery system to target immune cells for the treatment of traumatic brain injury. Her careful approach to research and attention to detail make her a skilled researcher; in just over a year, her first first-author manuscript was accepted to a high-impact journal (*Experimental Neurology*). In it, she showed for the first time that immune cells are recruited from the peripheral blood into the brain as quickly as 15 minutes after traumatic brain injury. Ms. Wofford is currently preparing two more first-author manuscripts describing the design of novel microparticle drug delivery systems that can manipulate macrophage phenotype intracellularly. This research represents the first time that a cell has been reprogrammed for cell therapy applications without using genetic engineering. A provisional patent application on this concept was submitted last year. She plans to apply this technology to the treatment of traumatic brain injury in a porcine model as the capstone project of her thesis, which will total four high-impact, first-author manuscripts, as well as numerous co-authored papers resulting from collaborations with students in several labs.

STUDENT AWARD FOR OUTSTANDING RESEARCH, GRADUATE



Rebecca Haley

Case Western Reserve University

Rebecca Haley's research focus is on the development of dual-drug-delivering sutures. She began her research evaluating the capacity of the human drug delivery system to break up bacterial biofilms (through delivery of biofilm-

busting compounds). She has gained significant experience in polymer synthesis, experimental design, drug delivery and research focused on antibacterial drug delivery. Her thesis project focuses on the use of affinity-based polymer-drug matrices for anti-inflammatory and antimicrobial dual release to resolve suture wounds. This research idea was entirely conceptualized by Ms. Haley, stemming in part from what she learned while writing her review paper ("Localized and targeted delivery of NSAIDs for treatment of inflammation: a review").

A special thank you to Awards, Ceremonies and Nominations Committee members — Thomas Webster, PhD; Karen J. L. Burg, PhD; Susan Napier-Thomas, PhD; Helen H. Lu, PhD; Delphine Dean, PhD; and Dan Lemyre, executive director — for their time and volunteer efforts selecting these prominent scientists to receive these prestigious awards.

STUDENT TRAVEL FELLOWSHIPS AND SCHOLARSHIPS

Being awarded with a travel scholarship to the 2019 SFB Annual Meeting means that students have the opportunity to meet with distinguished and seasoned scientists in the field, hear from state-of-the-art speakers, and learn about industry advancements. This will include topics such as 3D printing, cardiovascular biomaterials and blood compatibility, nanomaterials drug delivery, engineered microenvironments in health and disease, and much more.

The meeting also offers networking events where students can speak with attendees about potential internship opportunities, learn about specialties, and visit exhibitors.

Along with a complimentary membership in the SFB, the recipients will receive a grant for participation in the SFB Annual Meeting which covers all travel costs. They will also be assigned a graduate student mentor to guide them through the Annual Meeting and help them pursue their advanced degrees and career goals throughout the course of the year.

2019 CATO T. LAURENCIN TRAVEL FELLOWSHIPS

The Cato T. Laurencin Travel Fellowship, named in honor of a distinguished member of the Society For Biomaterials, supports under-represented minorities in the field of biomaterials. The 2019 fellowships have been awarded to Sydney Wimberley of the University of Connecticut and Kai Clarke of the Florida Institute of Technology through the Society For Biomaterials (SFB), made possible by grants from the Burroughs Wellcome Fund, the National Institutes of Health, and SFB member donations.

Dr. Cato Laurencin is well known for his commitment to mentoring. He is the recipient of the American Association for the Advancement of Science Mentor Award, and received the Presidential Award for Excellence in Science, Engineering and Math Mentoring from President Barack Obama in ceremonies at the White House. Dr. Laurencin is the 8th designated University Professor in UConn's history, the Albert and Wilda Van Dusen Distinguished Endowed Professor of Orthopaedic Surgery, and Professor of Chemical Engineering, Materials Science and Engineering, and Biomedical Engineering at the University of Connecticut. He is also the recipient of the National Medal of Technology and Innovation.

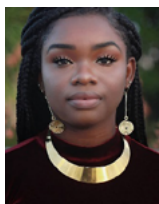
To be considered for the grant, students submit transcripts, a letter of support from an advisor or mentor, a project statement on their current work that is directly related to biomaterials, and a career goals statement.

2019 SFB Award Recipients (continued)



Sydney Wimberley's nomination included a career goal statement which stated, in part, that by receiving the Fellowship, it will present her with "the chance to participate, absorb, and learn about the field of study I am interested in pursuing."

Wimberley also states that she "grew up in a town adjacent to Hartford, CT where Dr. Laurencin has become a person of inspiration because of his outstanding scientific work in biomaterials, which has helped so many."



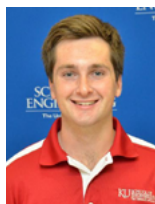
Kai Clark's nomination included a career goal statement which stated, in part, "One of my main goals in life is to aid in the creation of functioning synthetic organs so that no family has to go through the burden of wondering if the organ will arrive in time."

Clarke mentions that attending the Annual Meeting means that she would get to meet industry influencers and experience the "new and ingenious inventions made for the progression of implantable biomaterials."

For more information about the Cato T. Laurencin, MD, PhD Travel Fellowship, please visit the [webpage](#).

2019 C. WILLIAM HALL TRAVEL SCHOLARSHIP

The C. William Hall Travel Scholarship, honors the memory of the Society's first president, C. William Hall. The travel fellowship supports a junior or a senior undergraduate pursuing a bachelor's degree in bioengineering or a related discipline. The 2019 scholarship has been awarded to Evan Haas of the University of Kansas.



Evan Haas' goal of his proposed research is to investigate why compliant layers placed between mechanically stacked piezoelectric discs increase power input. The application of this work is for the development of tough piezoelectric composites to be used inside orthopedic implants to enhance bone integration and healing.

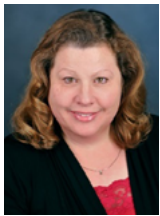
Haas states that "I think that it is very important, especially this early in my exploration of the field, to see all the possibilities and directions one can take in a career in biomaterials".

For more information about the C. William Hall Travel Scholarship, please visit the [webpage](#).

2019 SFB Officer Nominees

PRESIDENT-ELECT

The president-elect shall become familiar with the duties of the president and shall at all times, cooperate and assist with the duties of that office. In the absence of the president, the president-elect shall preside at the meetings of the Society, the Council and the Board of Directors, and perform the duties and exercise the powers of the President. The term of office is for a period of one year without succession. The President-Elect shall coordinate the duties of Council regarding the long-range direction and future of the Society.



Lisa Friis, PhD

University of Kansas

Biosketch

Dr. Elizabeth (Lisa) Friis is a professor in mechanical engineering at the University of Kansas and co-director of the product design and development track in the bioengineering graduate program. She was recently elected into the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows and will be inducted this year. Previously, Lisa was a research engineer at an orthopaedic research institute in Wichita, Kansas, where she worked directly with Dr. Frank Cooke, a founding member and the fourth president of SFB. They worked side by side with clinicians on biomaterials research and product development. This experience shaped her perspective of how biomaterials can be translated to help patients and the importance of clinical perspectives and regulatory influences in our field. At the University of Kansas, Dr. Friis ran a National Science Foundation (NSF) Research Experiences for Teachers site designed to develop lesson plans in bioengineering for fourth and fifth grade students and directed a graduate fellowship program on entrepreneurship for the University of Kansas Institute for Advancing Medical Innovation. She has served on many National Institutes of Health (NIH), NSF and foundation review panels. In addition to her faculty position, she is a co-founder of Evoke Medical, LLC, a startup based on discoveries in her lab on how piezoelectric composites can be incorporated into orthopaedic implants to promote bone healing. Her previous research resulted in translation of product concepts that have since been commercialized by two small companies. Dr. Friis has had a longstanding interest in working with industry, education and entrepreneurship that is reflected in her research and service.

Dr. Friis attended her first SFB Annual Meeting in Minneapolis in 1986 when she was a graduate student working with Drs. Joon Park and Rod Lakes. Her advisors were excellent role models for how both education and research can be translated. Attending this first SFB meeting opened her eyes to the broader world of how biomaterials are critical to implant design. She has been active in SFB since then and has served in many roles in Special Interest Groups (SIGs) and on the Board and council. Most recently, she served as the secretary-treasurer-elect from

2013 – 2017. Prior to that, she served on the Board and council in various roles, such as chair of the Education & Professional Development Committee and the Bylaws Committee. SIGs were an important part of her work in SFB, as she has served as an officer in several groups. Over the years, she has also led several workshops and initiatives in the Society. She is currently the advisor for her university's student chapter. Dr. Friis has demonstrated sustained commitment to SFB. If elected, she will continue to serve SFB with dedication to continuing the strategic development of the Society for continuous quality improvement.

Vision Statement

It is truly an honor to be nominated for president-elect for the Society For Biomaterials. If elected, I will serve with the knowledge that SFB is made up of a diverse group of people with a common goal of pushing the boundaries of discovery and development to benefit human health and well-being. If elected, I will work strategically with the Board, council and all members to ensure that the Society continues to serve, as our SFB vision statement says, as "the world's preeminent interactive global community committed to advancing excellence in all aspects of biomaterials science, engineering and technology for promoting human health and well-being." Our mission statement makes it clear that we are a "multidisciplinary society of academic, healthcare, governmental and business professionals dedicated to promoting advancements in all aspects of biomaterial science, education and professional standards to enhance human health and quality of life." We as a Society greatly value translation of our research so that it can help patients. In my opinion, our long-time focus on this aspect is one of our great strengths that we must maintain and grow. I believe that my translational experiences in working with clinicians, large industry and small companies will help me lead our Society appropriately along the lines of our strategic plan.

An aspect of SFB that I would like to grow if elected is the connection between SIGs and the more experienced members. I "grew up" professionally in SFB through working with SIGs. In my opinion, SIGs are a fantastic way for members to get involved and stay involved in many aspects of SFB. One thing that I believe could be enhanced in SFB is to create more avenues through which SIG leaders could be more involved with past officers and Board members of the Society. If I am fortunate enough to be elected, I would work to establish a formal program of interaction and guidance of SIG officers with former officers and Board members to even better grow and nurture our future leaders. Education has always been a foundation of SFB and must continue to be a primary focus of our Society. I would also work to establish a similar but less formal mechanism for past SFB officers, Board members and award winners to connect with student chapters via videoconferencing. I feel that it is critical that we learn from experience to guide the present and future and strive to reenergize each other along the way for the ultimate purpose of bringing technology to life to help patients.

2019 SFB Officer Nominees (continued)

Finally, if elected, it is very important to me to hear your ideas and receive your input and feedback throughout my years of service as president-elect, president and past-president. I strongly believe in the concept of continuous quality improvement while still following a guided long-term strategic plan. My goal is to work with the Board and council to continue and strengthen our passion for SFB and our mission for members of all ages and levels of experience.



Shelly Sakiyama-Elbert, PhD
The University of Texas at Austin

Biosketch

Dr. Shelly Sakiyama-Elbert holds the Fletcher Stuckey Pratt Chair as Professor and Department Chair of Biomedical Engineering at The University of Texas at Austin. She earned a BS in chemical engineering and biology from the Massachusetts Institute of Technology and an MS and PhD from the California Institute of Technology. She joined the faculty at Washington University (WU) in biomedical engineering in 2000 as an assistant professor, where she advanced to the position of Joseph and Florence Farrow Professor of Biomedical Engineering and vice dean for research in the School of Engineering and Applied Science. She joined the faculty at The University of Texas at Austin in August 2016. Her research focuses on developing biomaterials for drug delivery and cell transplantation for the treatment of peripheral nerve and spinal cord injury.

Her research is funded by the National Institute of Neurological Disorders and Stroke and the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIH), and she received early career awards from the Whitaker Foundation and the W.H. Coulter Foundation. She was co-director of the Center of Regenerative Medicine, as well as a member of the Institute of Materials Science and Engineering at WU. Her honors include Fellow of the National Academy of Inventors (2017), the SFB Clemson Award for Basic Research (2017), the WU Dean's Award for Excellence in Advising and Mentoring (2008), the WU Distinguished Faculty Award (2013) and Outstanding Faculty Mentor from the WU Graduate Student Senate (2015). She joined the College of Fellows for AIMBE in 2011; she was elected a Fellow of the Biomedical Engineering Society (BMES) in 2013, the American Association for the Advancement of Science in 2015 and the International College of Fellows in Biomaterials Science and Engineering in 2016. Her other professional roles include serving as an associate editor for the *Journal of Biomedical Materials Research Part A* and *Biotechnology and Bioengineering*, as well as membership on the editorial board of *Acta Biomaterialia* and serving as a standing member of the Biomaterials and Biointerfaces Study Section (2010 – 2013). She served as conference chair for the 2013 Gordon Research Conference on Biomaterials & Tissue Engineering and the 2017 BMES Annual Meeting.

Dr. Sakiyama-Elbert has been an SFB member for 20 years. She currently serves as secretary-treasurer (2017 – 2019) and previously served as secretary-treasurer-elect (2015 – 2017), where she has worked to ensure the long-term financial viability of the Society. She also served as a member of the Long-Range Planning Committee (2003 – 2006) and the Membership Committee (2004 – 2007). She held officer positions in both the Cell and Organ Therapies SIG and the Tissue Engineering SIG. She is one of the four new co-editors for the *Biomaterials Science* textbook 4th edition, which supports SFB through donation of all royalties from the textbook to the Society.

Vision Statement

I am honored to be nominated for the position of president-elect. The Society For Biomaterials has been my home professional society since I was in graduate school and has been a critical source of mentorship and collaborations for me throughout my career. My vision is that SFB would continue to be the place to discuss outstanding science, network with community members and nurture the next generation of leaders in our field in an inclusive environment.

If elected, I will focus on supporting our thriving international community in academia, industry and government to impact scientific research, translational development and clinical practice by focusing on three major areas:

Increasing Value to Members. I will strive to ensure that members from all sectors of our field see value in SFB membership. While much of the value may come from attending the Annual Meeting, we need to increase the opportunities to provide value to our members throughout the year. We need to support our student/early career members as they transition to the next career phase and demonstrate the continued value of membership for our nonacademic community members. The Young Scientist Group has done an excellent job of building networking opportunities for our newer community members, and we need to continue to expand these efforts to support all of our young professionals.

Fostering Scientific Excellence and Inclusion. I will work with the council and Program Committee to continue to enhance the scientific quality of our annual and regional meetings (e.g., Biomaterials Days). These gathering points are critical for the inclusive exchange of scientific ideas and diverse points of view. The dissemination of our latest research, discussions on the challenges of the field and opportunities to network with others in our field are critical for our community.

Highlighting the Impact of Biomaterials and SFB Members. I will work to highlight the importance of biomaterials in human health and healthcare delivery beyond just our field, to the broader scientific community and the public. I will also work to showcase the positive contributions of our community and the impact of

2019 SFB Officer Nominees (continued)

our work. I will work to partner with other professional societies and policy groups with mutual interests to share our expertise and to inform new healthcare policy.

If elected, it would be my honor to lead SFB and to give back to an organization that has given so much to me personally and professionally throughout my career.

SECRETARY-TREASURER-ELECT

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



Bingyun Li, PhD

West Virginia University School of Medicine

Biosketch

Dr. Bingyun Li is a professor and the director of the Nanomedicine Laboratory in the Department of Orthopaedics at West Virginia University. Dr. Li joined West Virginia University as an assistant professor in 2005 and was promoted to associate and full professor in 2011 and 2017, respectively. His research focus is orthopaedic biomaterials with an emphasis on innovative therapeutics and biomaterials for infection prevention and treatment. His research has been funded by NIH, NSF, the U.S. Department of Defense (DoD), the U.S. Department of Energy (DoE), and some biomaterials and orthopaedic foundations.

Dr. Li has published 79 peer-reviewed journal papers (h-index=33), nine book chapters, two edited books (38 chapters) and 14 U.S. patents and patent disclosures. His group has produced 130 scientific abstracts for national and international conferences, and Dr. Li has given 55 invited talks. Dr. Li has mentored and trained 101 trainees, including one assistant professor (a West Virginia Clinical and Translational Science Institute scholar and NIH K08 recipient), eight orthopaedic research residents, 20 MD students, 12 PhD students, eight post-doctoral associates, one master's student, 38 undergraduate students, one high school student and 12 visiting scholars. Of these trainees, 31 percent are women and people from underrepresented groups in sciences.

Dr. Li has been a grant reviewer for NIH, NSF, DoD, the U.S. Department of Veterans Affairs, and many foundations and international funding agencies. He has also been a reviewer for 69 national and international journals, including *Biomaterials*, *Acta*

Biomaterialia, the *Journal of Biomedical Materials Research Part A* and the *Journal of Biomedical Materials Research Part B*. He is an associate editor of a prestigious microbiology journal, *Frontiers in Microbiology*. He has been serving on the faculty senate at West Virginia University since 2014 and has served on other committees, including the Research Integrity Committee, the Admissions Committee for the PhD program in clinical and translational science, the Research and Scholarship Committee and the Biomedical Engineering Program Committee at his institution.

Dr. Li is an active participant in the Society For Biomaterials. He has been active in the Orthopaedic Biomaterials SIG for many years, including serving as the vice chair (2011 – 2013 and 2013 – 2015) and chair (2015 – 2017 and 2017 – 2019) in recent years. He has been reviewing abstracts for Annual Meetings and has organized sessions and symposia numerous times. Dr. Li is also active in the Orthopaedic Research Society, the American Society for Microbiology, the American Chemical Society, the Chinese Association for Biomaterials and the International Chinese Musculoskeletal Research Society, where he has served in various roles, including treasurer, secretary, newsletter chief editor, topic chair, symposium organizer and moderator, and abstract reviewer.

Vision Statement

It is an honor to be nominated for the position of secretary-treasurer-elect. SFB has long been my academic society home. The Society has been an incredible support resource throughout my career by providing me and others with invaluable opportunities for career development. I have always valued the training and opportunities that I have received here. I strongly believe that our Society is important and vital to support biomaterials innovation and translation and to prepare the biomaterials workforce for the future.

The long-term planning and responsible stewardship of financial resources are critical to the stability and growth of the Society. As secretary-treasurer-elect, I will learn from and support the current secretary-treasurer in managing Society budgets. This experience will prepare me to make appropriate fiscal recommendations and prioritization to the Board of Directors and council in the subsequent year. I will be careful in balancing meeting expenses and revenues, membership fees, new initiatives and other activities to achieve the Society's goals. I will strive, in my capacity, to support and strengthen the diversity of our membership, to support the career development of members and to support initiatives that will bring together national and international members of the Society from academia, industry and government agencies. I will dedicate my energy and passion to serve the members and the Society and will strive to use our funds wisely and effectively.

2019 SFB Officer Nominees (continued)

**Sarah Stabenfeldt, PhD**

Arizona State University

Biosketch

Dr. Sarah Stabenfeldt is an associate professor in the School of Biological and Health Systems Engineering at Arizona State University (ASU). She received her BS in biomedical engineering from Saint Louis University and her PhD in bioengineering from the Georgia Institute of Technology, where she received an NIH National Research Service Award pre-doctoral fellowship. Dr. Stabenfeldt was then selected for an NIH Institutional Research and Academic Career Development Award post-doctoral fellowship at Emory University that enabled her to continue biomaterials-based research at Georgia Tech with Dr. Thomas Barker. She joined ASU as a tenure-track faculty in 2011, where she leads her research team in developing biomaterials-based therapeutics and diagnostics for acute neural injury. Her current research projects span nanoparticle delivery after brain injury to neural injury biomarker discovery to neural tissue engineering/regenerative medicine. In addition, Dr. Stabenfeldt has developed a large-scale innovative biomaterials undergraduate laboratory course that has been presented at national meetings (BMES, SFB, ASEE).

Dr. Stabenfeldt's research is funded via federal (NIH, NSF), state (ABRC) and private foundation/clinical sources (Flinn Foundation, Phoenix Children's Hospital, Mayo Clinic). Dr. Stabenfeldt has also received a number of prestigious awards, including the NIH Director's New Innovator Award (2014), the NSF CAREER Award (2015) and the Arizona Biomedical Research Consortium Early Stage Investigator Award (2015). Additional honors include the William J. Dorsen Jr. Excellence in Research Award (2016), PLuS Alliance Fellow (2016), Emerging Investigator from the *Journal of Materials Chemistry B* (2017), Emerging Investigator from *Biomaterials Science* (2017) and Fulton Exemplar Faculty (2018).

Dr. Stabenfeldt has been an active member of SFB for more than 16 years, since she was a graduate student. Dr. Stabenfeldt has consistently contributed to SFB Annual Meeting content by co-organizing sessions and most recently serving on the Program Committee for the 2018 and 2019 Annual Meetings. She has also served as the SFB vice chair (2013 – 2015) and chair (2015 – 2017) of the Engineering Cells & Their Microenvironment SIG. She is currently the SIG representative to the SFB Board and council (2017 – 2019). Dr. Stabenfeldt is also an active member of BMES and the National Neurotrauma Society. She has served on the BMES Student Affairs Committee (2011 – 2015), as BMES ASU Chapter faculty advisor (2011 – present) and as the Neural Engineering track chair for the 2017 BMES Annual Meeting.

Vision Statement

It is truly an honor to be nominated for the position of SFB secretary-treasurer-elect. The SFB community has shaped the trajectory of my academic career and to this day continues to provide a strong, supportive network of scientific peers and colleagues. As a graduate student, I was fortunate to have directly benefited from the STAR award program, and that piqued my interest in giving back to the community. For the past two years (2017 – 2019), I have served as SIG representative to the SFB Board and council, an integral position that connects SIG constituents with the SFB Board and vice versa. This experience, combined with prior SIG leadership positions, uniquely prepares me for the position of secretary-treasurer-elect. Specifically, I have worked closely with the past and present secretary-treasurers and Finance Committees to evaluate SIG budget proposals and shift SIGs to a revenue-neutral model. These direct interactions with the secretary-treasurer imparted the importance of this position to ensuring financial fidelity for the Society.

If elected, my first task will be to work with and learn all aspects of the position from the current secretary-treasurer to ensure continuity and critical knowledge transfer of the financial system. As the position evolves, I will serve as the fiscal voice for SFB, making sound financial recommendations to the Board that will promote a solid financial foundation for the SFB community. I will also work with committee chairs to support SFB growth across all levels and sectors (trainee, academic and industry) and events that align with the mission of SFB. Moreover, I will strive for an open and transparent line of communication between the membership and Board. It would truly be an honor and privilege to serve the SFB community in this critical leadership role.

MEMBER-AT-LARGE

The member-at-large shall serve as an unencumbered representative of the membership at meetings of both the Board of Directors and the council. The member-at-large shall serve for a period of one year.

**Roger Narayan, PhD**

University of North Carolina and North Carolina State University

Biosketch

Dr. Roger Narayan has been a professor in the Joint Department of Biomedical Engineering at the University of North Carolina and North Carolina State University since 2009. He works on the use of laser techniques, such as pulsed laser deposition, laser micromachining, matrix-assisted pulsed laser evaporation and laser-based additive manufacturing techniques for processing of biomaterials. Many types of laser-processed biomaterials have enhanced functionality over conventionally processed materials and have potential applications in drug

2019 SFB Officer Nominees (continued)

delivery, biosensing and tissue engineering. Dr. Narayan has authored more than 100 publications and several book chapters on processing, characterization and modeling of laser-processed biomaterials. He has taught biomaterials science to undergraduate students and graduate students since 2003. In addition, he has developed nanobiotechnology certificate programs at the University of North Carolina and at North Carolina State University. Dr. Narayan has given numerous invited research presentations and tutorials on laser-processed biomaterials at international materials engineering and medical device conferences. He has organized workshops on additive manufacturing at SFB Annual Meetings since 2007. He is also a member of the Biomaterials Education SIG. Earlier in his career, he received an NSF Faculty Early Career Development (CAREER) Award and an Office of Naval Research Young Investigator Award. Dr. Narayan's work is currently funded by NIH, NSF and industry. He was elected as Fellow of AIMBE in 2012.

Vision Statement

Members expect the Society For Biomaterials to continuously work toward enhancing the value of their memberships. If elected as member-at-large, I plan to work with the Society's members and leadership to enhance the value of Society membership through initiatives that span the career of a biomaterials scientist, including:

The development of new mechanisms for more undergraduate students and graduate students to become more involved with the Society. Many universities have yet to develop student chapters. I would like to work with colleagues in the Society to develop electronic and live resources that help students and faculty members form and grow student chapters.

The development of new live and electronic mechanisms to share information with students and young professionals. Better dissemination of information on summer training programs, graduate programs, post-doctoral opportunities, job placement and networking activities would help young people find research, educational and career opportunities outside of their immediate networks.

The development of more robust conference activities in the fall. Regional meetings such as Biomaterials Days do an excellent job of bringing together students and researchers at various sites around the country, but there is still room for an annual national fall event where ideas can be exchanged and networking can occur. To differentiate a fall event from the Annual Meeting, the fall event could focus on (1) presentations (both oral and poster) from young professionals and (2) networking between young professionals and potential employers.

The development of the Society as a platform for international networking in the field of biomaterials. The horizons of

biomaterials students are more international than in previous years, with more students participating in study abroad programs and international research collaborations than ever before. The Society can facilitate international networking through activities focused on international research collaborations at the Annual Meeting, active recruitment of international programming at the Annual Meeting, webinars featuring international collaboration opportunities and dissemination of information on international research opportunities via newsletters.

I have been involved with programming of workshops and symposia on 3D printing at Society For Biomaterials Annual Meetings and World Biomaterials Congresses since 2007. 3D printing is only one example of an interdisciplinary topic that is ripe for partnering with other societies (e.g., the Society of Manufacturing Engineers and the American Society of Mechanical Engineers) to develop joint workshops and other joint activities.

The development of mechanisms for the Society and its members to reach out to the wider community. Many Society members visit schools and partner with museums. I would like to work with colleagues in the Society to develop new mechanisms to convey best practices related to biomaterials outreach, including enhanced support of the Biomaterials Education Outreach Challenge, webinars from leaders in science outreach and live science outreach workshops.

The cultivation of older members as a resource for the Society and its members. As the "baby boom" generation retires, the Society is potentially losing the expertise of our most experienced and accomplished members. It is crucial that the Society develops mechanisms to keep these individuals engaged in the Society and involved in its future. Mechanisms that facilitate mentoring of young people via mentoring events at the Annual Meeting or electronic pairing of mentors and mentees can help older members, younger members and the Society.

Most importantly, I will reach out to everyone — students, young professionals and those in academia, government and industry — to improve the Society and enhance the value of Society membership, if elected.



Cherie Stabler, PhD

University of Florida

Biosketch

Dr. Cherie Stabler is a tenured professor and associate chair for graduate studies in the Department of Biomedical Engineering, College of Engineering, at the University of Florida. She also is an affiliate member of the University of Florida Diabetes Institute. She has been an active and involved member of the Society For Biomaterials since 2002. She received her PhD in biomedical

2019 SFB Officer Nominees (continued)

engineering from the Georgia Institute of Technology and Emory University in 2004 and conducted her post-doctoral work in the Department of Surgery at Emory University (2004 – 2006). Prior to moving to the University of Florida in 2015, she was an associate professor in biomedical engineering at the University of Miami, where she also served as the director of the tissue engineering laboratory at the Diabetes Research Institute (2006 – 2014).

Dr. Stabler has established an internationally recognized research and educational program focused on the generation of translational biomaterial platforms for cellular implants, with a particular emphasis on treating Type 1 diabetes. Her novel bioactive materials are targeted at enhancing cellular graft survival and using local and translational approaches to dampen host immunological responses. Her work spans from designing new biomaterials using chemoselective ligation strategies to seeking U.S. Food and Drug Administration clearance for implanting combinatory products. Her research has resulted in publications across a spectrum of journals, from *Biomaterials* to the *Proceedings of the National Academy of Science* to *Advanced Healthcare Materials* and five patents with research funding from NIH (DP2, R01, UC4, SBIR) and numerous nonprofit agencies (JDRF, Helmsley). She is an elected fellow of AIMBE and the recipient of the 2008 NIH National Institute of Diabetes and Digestive and Kidney Diseases Type 1 Diabetes Pathfinder Award.

She is a member of the NIH Bioengineering, Technology and Surgical Sciences Study Section, the American Diabetes Association Grant Review Committee, the JDRF Encapsulation Consortia, the NIH Human Islet Research Network and the editorial board of *Journal of Biomedical Materials Research Part A*. Dr. Stabler will chair the 2019 Tissue Engineering and Regenerative Medicine Americas meeting in Orlando, Florida, in December 2019. In addition to research, she is a strong educator, serving as associate chair for graduate programs and primary advisor to more than 15 doctoral, 15 masters and 50 undergraduate students. With a focus on improving parity in representation in the sciences, her mentored students exhibit high diversity (58 percent female and 35 percent underrepresented minority). She also serves as the co-director of NIH T32, “Interdisciplinary Graduate Program in Type 1 Diabetes and Biomedical Engineering.” Her mentees have gone on to tenure-track faculty positions at research I universities, management positions at R&D divisions, regulatory consulting positions, and research director positions at nonprofits.

Vision Statement

First, I want to acknowledge that it is an honor to be nominated for the position of member-at-large for the Society For Biomaterials.

As a member of this community for more than 15 years, this Society has been an integral part of my academic career, serving not only as a robust conference for presenting research but also as a supportive and engaging community that has helped me navigate this complex academic world. I am forever grateful for the sense of comradery I have found in this Society, and I would be honored to have the opportunity to give back a little of what has been given to me. I believe my experience and interests in biomaterial development, translational research, industrial and clinical collaborations, education and diversity will serve me well in this role as member-at-large.

From my prospective, the value of membership in the Society For Biomaterials is a result of its high member engagement. There are numerous highly active members of SFB who give so much of their time to our conferences, publications and website. This results in a prominent Society with Annual Meetings that are well organized, engaging and scientifically robust, as well as other engagement initiatives (SIGs, student chapters, *Biomaterials Forum* issues, its website, etc.) that provide professional development opportunities and community building. Furthermore, SFB seeks to promote diversity and inclusion. To preserve this critical engagement, members must continue to feel that their membership is valuable and that their voice and presence is respected and welcomed. Our meetings currently reflect cutting-edge research and collaborative approaches by including members across disciplines and from various sectors (i.e., clinical, industry, academia, government and funding agencies). Providing opportunities to receive feedback from these communities can ensure that we continue to provide value to their membership and accommodate their specific needs. Further, fostering collaborative sessions that highlight their unique prospective ensures that our Society members are kept up to date on the challenges facing these sectors. To sustain our culture of a supportive and inclusive membership, our Society should continue to include sessions that highlight the importance of diversity (e.g., women’s luncheons), but these efforts should expand to promote global inclusion through broader panels that discuss challenges for underrepresented groups in this community and the impact of conscious and unconscious bias. The inclusion of policies on harassment and protocols for reporting concerns in our meeting materials and bylaws will also provide a clear statement that reflects the current sentiments of our Society. For our student and young investigator members, we should strengthen our mentorship program, as well as provide defined opportunities for these groups to design symposia and sessions. Overall, I look forward to lending my time and voice to help further elevate the membership value and sense of community present in this esteemed Society.

REGISTRATION BROCHURE



SOCIETY FOR BIOMATERIALS 2019 ANNUAL MEETING & EXPOSITION

APRIL 3-6, 2019 • WASHINGTON STATE CONVENTION CENTER • SEATTLE, WA



THE
PINNACLE

OF BIOMATERIALS
INNOVATION AND
EXCELLENCE



Society For
Biomaterials

www.biomaterials.org

PUBLIC
MARKET
CENTER



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.

SFB President

Andres J. Garcia, PhD
Georgia Institute of Technology

SFB 2019 PROGRAM COMMITTEE CHAIRS



Committee Chair
Gopinath Mani, PhD
Abbott



Committee Chair
William Murphy, PhD
University of Wisconsin

SFB 2019 PROGRAM COMMITTEE

Rebecca Carrier, PhD
James M. Curtis, BChE, ME
Andres J. Garcia, PhD
Robert Hastings, MS, PE
Floyd Karp, PhD
Kurtis Kasper, PhD
David H. Kohn, PhD
Ankur Singh, PhD
Sarah E. Stabenfeldt, PhD
Johnna Temenoff, PhD

SFB STAFF

Executive Director

Dan Lemyre, CAE
dlemyre@biomaterials.org

Assistant Executive Director

Pam Gleason
pgleason@biomaterials.org

Meeting Coordinator

Jeana Hoffman
jhoffman@biomaterials.org

Membership Coordinator

Shena Seppanen
sseppanen@biomaterials.org

PROGRAM OVERVIEW

The Pinnacle of Biomaterials Innovation and Excellence

Seattle has always been the hub for global health, medical innovations, and cutting-edge biomedical research. Similarly, the society has been the core hub for excellence in biomaterials by bringing together an international community of academic researchers, industry scientists, clinicians, regulatory professionals, and entrepreneurs to share knowledge and to learn recent developments in basic and applied biomaterials research. Seattle thus provides an excellent setting for the 2019 Society for Biomaterials annual meeting, which will be a “pinnacle” of biomaterials innovation and excellence to educate, learn, and collaborate across various scientific disciplines including materials science, biology, engineering and medicine for improving human health.

2019 KEYNOTE SPEAKER

Rick Horwitz, PhD

Executive Director, Allen Institute for Cell Science

Rick Horwitz is the inaugural Executive Director of the Allen Institute for Cell Science in Seattle. Previously, he was a University Professor and Harrison Distinguished Professor of Cell Biology at the University of Virginia. He also served as the Director of the Cell Migration Consortium: an NIH-funded multi-institutional, multi-disciplinary collaboration. Previously, he served as the Head of the nascent Department of Cell and Developmental Biology at the University of Illinois and was a Professor of Biophysics and Physical Biochemistry at the University of Pennsylvania. Rick earned his B.A. in the Honors Program at UW Madison, majoring in chemistry (math, physics). He received his Ph.D. in Biophysics at Stanford University and did postdoctoral research in NMR at UC Berkeley. He has served on numerous strategic planning, editorial and advisory committees and organized many international meetings and symposia. Rick is known for his pioneering and leadership roles in cell adhesion, migration, and live-cell imaging.





HIGHLIGHTS OF THE 2019 MEETING WILL INCLUDE:

Thought Leaders

- David Castner, PhD
- Jennifer H. Elisseeff, PhD
- Allan Hoffman, PhD
- Thomas Horbett, PhD
- Buddy Ratner, PhD
- International College of Fellows Session

Tutorials

Tutorials 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.

- Advocating for Biomaterials
- Best Practices for Immunohistochemistry and Foreign Body Tracking/Measurements

Panels

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

- How to Translate your Research into Successful Biomaterials Therapies
- Strategies for Effective and Engaged Teaching
- Biomaterials in Industry: Past, Present, and Future
- Establishing Industry Experiences During Graduate School
- Regulatory Translational Science Focused on Commercialization Challenges for Surface Modification and their Characterization: SIG-SQUARED
- Recent Developments in ISO 10993 Series of Standards for Biocompatibility Testing and Evaluation
- Translational Considerations for 3D Printing Biomaterial-Based Constructs

Workshops

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. Workshops take place on Wednesday, April 3rd 2019 8:00 am – 12:00 N:

1. New Directions in Biomedical Surface Analysis
2. Biomaterials Science Excellence and Technology Translation workshop
3. Recent Advances in 3D Printing of Biomaterials
4. Active Biomaterials
5. Communication and Networking for Biomaterials Professionals will not have a registration fee, since this workshop will be attended by many students.

Facility Tour: University of Washington Biomaterials Labs

Wednesday, April 3, 2019
9:00am to 12:30 pm

Graduate students and faculty will guide attendees on a tour on several of the Biomaterials Labs at the University of Washington (UW), including the NESAC/BIO surface analysis and the Molecular Analysis instrumentation facilities. The tour will feature hands-on demonstrations from the UW Bioengineering Department, Chemical Engineering Department and the Molecular Engineering and Science Institute (MoES). Box lunches will be provided, giving time for attendees to interact with biomaterials-oriented students and faculty from the UW.



COMPETITIONS

Biomaterials Education Challenge

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

2019 Business Plan Competition

Students and post docs: Medical technology requires more than just laboratory results to become a reality. Do you believe that your biomaterials-based research innovation has the potential to succeed in the medical device industry?

Put your skills to the test in this unique session designed to challenge you to consider the commercialization aspects of your research.

Individuals and groups (your choice) will be judged by experts from investing, industry, regulatory, and academia on the strength of their commercialization plans.

Prizes will be awarded to the top teams, including audience's choice. To participate, submit an abstract that

contains your Executive Summary, including information on your technology, the market, and the commercialization strategy.

Those selected will give a 10-minute pitch followed by Q&A “Shark Tank” style from judges and audience.

“Career Catalysis Track” sessions

1. Panel Discussion: Strategies for Effective and Engaged Teaching
2. Panel Discussion: Establishing Industry Experiences During Graduate School
3. Workshop: Communication and Networking for Biomaterials Professionals
4. Panel Discussion: How to translate your research into successful biomaterials therapies
5. Panel Discussion: Biomaterials in Industry: Past, Present, and Future
6. SFB Business Plan Competition

“Industry Track” sessions

1. From Bench-to-Bedside: Translating Biomaterials Research 1
2. From Bench-to-Bedside: Translating Biomaterials Research 2
3. Panel Discussion: Regulatory Translational Science Focused on Commercialization Challenges for Surface Modification and their Characterization: SIG-SQUARED
4. Panel Discussion: Recent Developments in ISO 10993 Series of Standards for Biocompatibility Testing and Evaluation
5. Panel Discussion: Translational Considerations for 3D Printing Biomaterial-Based Constructs
6. Panel Discussion: How to translate your research into successful biomaterials therapies
7. Panel Discussion: Biomaterials in Industry: Past, Present, and Future
8. SFB Business Plan Competition



PRELIMINARY PROGRAM

All Sessions will take place at the Washington State Convention Center
(Tentative and Subject to Change)

Wednesday, April 3, 2019

- 7:30 AM – 7:00 PM** **Registration Open**
(Yakima Level Lobby)
- Workshops:**
- 8:00 AM – 10:00 AM** • New Directions in Biomedical Surface Analysis
- 8:00 AM – 10:00 AM** • Biomaterials Science Excellence and Technology Translation
- 10:00 AM – 12:00 N** • Recent Advances in 3D Printing of Biomaterials
- 10:00 AM – 12:00 N** • Active Biomaterials
- 10:00 AM – 12:00 N** • Communication and Networking for Biomaterials Professionals
- 8:30 AM – 12:30 PM** **Tour:** University of Washington
- 1:00 PM – 3:00 PM** **Concurrent Session I**
- Thought Leader: Jennifer Elisseeff
 - Nanomaterials for Therapeutic Delivery
 - Engineered Biomaterials for Neural Applications 1
 - Orthopedic Biomaterials SIG 1
 - From Bench-to-Bedside: Translating Biomaterials Research *BTI* 1
 - Cardiovascular Biomaterials and Blood Compatibility
 - Panel Discussion: Strategies for Effective and Engaged Teaching
 - 3D Printing and Bioengineered Tissues for In Vitro Disease Modeling and Pulmonary Applications
- 3:15 PM – 4:45 PM** **Concurrent Session II**
- Biomaterials for Therapeutic Drug Delivery
 - Nanomaterials drug delivery

- 3:15 PM – 4:45 PM** *Concurrent Session II (Continued)*
- Dental/Craniofacial Biomaterials SIG
 - Orthopedic Biomaterials SIG
 - Immunomodulatory Biomaterials
 - Engineered Microenvironments in Health and Disease
 - 3D Bioprinting Applications in Tissue Engineering and Regenerative Medicine
 - Biomaterials for Regenerative Engineering
- 5:00 PM – 6:30 PM** **Opening Ceremony**
Keynote Address:
Rick Horwitz, PhD
Executive Director
Allen Institute for Cell Science
- 6:30 PM – 8:30 PM** **Opening Reception**
(In the Exhibit Hall)

Thursday, April 4, 2019

- 7:00 AM – 6:30 PM** **Registration Open**
(Yakima Level Lobby)
- 7:00 AM – 7:45 AM** **Special Interest Group Meetings**
- 8:00 AM – 10:00 AM** **Plenary Session I**
Clemson Awards
- **Clemson Award for Basic Research:**
Paulette Spencer, DDS, PhD
University of Kansas
 - **Clemson Award for Applied Research:**
Christine Schmidt, PhD
University of Florida
 - **Clemson Award for Contributions to the Literature:**
Balaji Narasimhan, PhD
Iowa State University



10:30 AM – 12:30 PM

Concurrent Session III

- Thought Leader: Tom Horbett and David Castner, PhD
- From Bench-to-Bedside: Translating Biomaterials Research *BTI* 2
- Biomaterials for Cardiovascular Regeneration
- Nanomaterials SIG
- Targeted and Stimuli-Responsive Biomaterials
- Protein and Cells at Interfaces SIG
- Orthopedic Biomaterials SIG 2
- Guided Tissue Regeneration

12:30 PM – 1:30 PM

**Lunch on own
Women’s Lunch**

1:45 PM – 3:45 PM

Concurrent Session IV

- Next-Generation Biomaterials for Treatment of Type 1 Diabetes
- Dental/Craniofacial Biomaterials SIG
- Recent Advances in Antimicrobial and Antibiofilm Materials 1
- Panel Discussion: Regulatory Translational Science Focused on Commercialization Challenges for Surface Modification and their Characterization: SIG-SQUARED
- Immunomodulatory Biomaterials
- Next-Gen Tissue Adhesives and Clinical Applications
- Biomaterial-Tissue Interaction SIG
- Engineering Cells and Their Microenvironments SIG

3:45 PM – 4:15 PM

Break in Exhibit Hall

4:15 PM – 6:15 PM

Concurrent Session V

- Thought Leader: Allan Hoffman and Buddy Ratner, PhD
- Drug Delivery SIG

4:15 PM – 6:15 PM

Concurrent Session V (Continued)

- Panel Discussion: Recent Developments in ISO 10993 Series of Standards for Biocompatibility Testing and Evaluation
- Cardiovascular Biomaterials SIG
- Panel Discussion: Establishing Industry Experiences During Graduate School
- Multifunctional Biomaterials: Recent Developments and Future Directions
- Engineering Reproduction
- Tissue Engineering SIG

6:30 PM – 8:00 PM

Poster & Exhibit Reception

Friday, April 5, 2019

7:00 AM – 5:00 PM

Registration Open
(Yakima Level Lobby)

7:00 AM – 7:45 AM

Special Interest Group Meetings

8:00 AM – 10:00 AM

Plenary Session II
SFB Awards

- **Founders Award:**
Joachim Kohn, PhD
Rutgers University
- **Technology Innovation and Development Award:**
Ann Beal Salamone
Rochal Industries
- **Mid-Career Award:**
Edward A Botchwey, PhD
Georgia Tech/Emory University
- **Young Investigator Award**
Stephanie Seidlits, PhD
UCLA

10:30 AM – 12:30 PM

Concurrent Session VI

- Thought Leader: ICF Fellows Session
- Non-Viral Delivery for Gene Therapy and Editing
- Biomaterials for Regenerative Engineering 1



- 10:30 AM – 12:30 PM** *Concurrent Session VI (Continued)*
- Recent Advances in Antimicrobial and Antibiofilm Materials 2
 - Biomaterial Technologies for Hemostasis and Wound Care
 - Panel Discussion: How to Translate your Research into Successful
 - Biomaterials Therapies
 - Surface Characterization and Modification SIG
 - Bioelectronics and Biosensors

12:30 PM – 1:30 PM Lunch on own
Student Lunch

- 1:45 PM – 3:45 PM** **Concurrent Session VII**
- Tutorial: Advocating for Biomaterials
 - Functional Biomaterials to Control and Direct Cellular Function 1
 - Biomaterials for Therapeutic Drug Delivery 2
 - Ophthalmic Biomaterials SIG
 - Biomaterials for Regenerative Engineering 2
 - Panel Discussion: Translational Considerations for 3D Printed Biomaterial-Based Constructs
 - SFB Business Plan Competition *BTI*
 - Developing Better Biomaterials: Advances in Technologies and Understanding of Surface Modification

3:45 PM – 5:15 PM **Poster Session II in Exhibit Hall**

5:15 PM – 6:15 PM **SFB Annual Business Meeting**
SFB National Student Chapter Meeting

7:00 PM – 10:00 PM **Biomaterials BASH at the Seattle Art Museum**

Saturday, April 6, 2019

7:00 AM – 11:00 AM **Registration Open**
(Yakima Level Lobby)

- 8:00 AM – 10:00 AM** **Plenary Session III**
- **Acta Biomaterialia Gold Medal:**
Antonios Mikos, PhD
Rice University
 - **Acta Biomaterialia Silver Medal:**
Jason Burdick, PhD
University of Pennsylvania

- 10:30 AM – 12:30 PM** **Concurrent Session VIII**
- Tutorial: Best Practices for Immunohistochemistry and Foreign Body Tracking/Measurements
 - Biomaterials for Therapeutic Drug Delivery 1
 - Panel Discussion: Biomaterials in Industry: Past, Present, and Future
 - Immune Engineering SIG
 - Functional Biomaterials to Control and Direct Cellular Function 2
 - Engineered Biomaterials for Neural Applications 2
 - Engineered Microenvironments in Health and Disease
 - 3D Bioprinting Applications in Tissue Engineering and Regenerative Medicine



HOTEL INFORMATION/ RESERVATIONS

For your convenience, sleeping rooms have been reserved at the Westin Seattle. The hotel can be contacted directly for individual reservations and they are on a first-come, first-serve basis. Please be sure to reference the Society For Biomaterials or SFB 2019 Annual Meeting & Exposition when making reservations.

The special room rate will be available until March 17, 2019 or until the group block is sold-out. After this date the prevailing rates for the hotel will apply.

To reserve a room at the group rate, visit the SFB website or contact the hotel directly by calling (206) 728-1000, please be sure to reference the Society For Biomaterials.

The Westin Seattle
1900 5th Avenue
Seattle, Washington 98101
+1 (206) 728-1000

CONFERENCE RATES

Sleeping room rates have been reserved for attendees at a conference rate of \$199.00 single/double occupancy plus taxes.

Conference rates are available from March 31, 2019 to April 6, 2019, based on availability.

GENERAL INFORMATION

Abstract Publication

If you would like a printed copy of all the abstracts, you may pre-purchase a Transactions Book through online registration. You will be sent a Transaction book after the meeting.

Badges

Please pick up your conference badge at the registration desk (in the Yakima Lobby) upon your arrival to the Conference Center. You must wear your badge throughout the conference as it is to identify you as a SFB 2019 Annual Meeting & Exposition attendee. If you misplace your badge, please go to the registration desk for a replacement.

Biomaterials BASH

Join your colleagues at the Seattle Art Museum for the 2019 Biomaterials BASH being held on Friday, April 5, 2019 from 7:00 pm – 10:00 pm.

Certificate Of Attendance

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

Currency Exchange

SEATTLE TACOMA AIRPORT

Currency Exchange & ATMs are located at Main Terminal, at Ticketing Level's south end, in the Baggage Claim, on Concourse A, and in the South Satellite.

Dress Code

Business casual is the recommended dress for the meeting.

Passports And Visas

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

Before traveling to the U.S., a citizen of a foreign country must generally obtain a non-immigrant visa for temporary stay. If a visa is required, please contact Society For Biomaterials' Meeting Coordinator, Jeana Hoffman at jhoffman@biomaterials.org to receive documentation explaining your intended purpose of travel to the U.S. Visa applicants should apply well in advance of your travel departure date.

For more information on passports and visas, please visit travel.state.gov.

The official language of the meeting is English.

Registration

All attendees are encouraged to pre-register for the meeting. By registering early, attendees can benefit from a reduced rate. To take advantage of this economic offer, register by March 16, 2019 as part of our Early Bird Registration. Attendees can register via the SFB Conference website, 2019.biomaterials.org, or by using the paper form attached to this brochure.



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

MEMBER RATES

Member rates apply to members of the Society For Biomaterials, USA, and other world biomaterials congress societies such as Australian Society for Biomaterials, European Society for Biomaterials, the Japanese Society for Biomaterials, and Korean Society for Biomaterials and TERMIS. Members of TERMIS or world biomaterials congress societies must upload a photocopy of a current dues receipt or membership card during the registration process to qualify for the member discount. Probationary Special Interest Group members do not qualify for member rate.

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

Refunds

To cancel your registration and receive a refund, a written request must be received by March 16, 2019. Cancellations can be made by contacting Society For Biomaterials' Meeting Coordinator, Jeana Hoffman at jhoffman@biomaterials.org or at (856) 380-6917. Cancellation requests received by this date will receive a refund less a \$75 processing fee. Requests will be processed upon notification. All requests received after March 16, 2019, will forfeit 100 percent of monies paid.

Session Locations

All sessions of the meeting, including exhibits, posters and oral presentations will take place at the Washington State Conference Center (across from the Washington State Convention Center).

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 individ-

uals because of the absence of auxiliary aids and services. If you require any auxiliary aids or services identified in the Americans with Disabilities Act, please contact Society For Biomaterials' Meeting Coordinator, Jeana Hoffman at jhoffman@biomaterials.org or (856) 380-6917.

Sponsorship and Exhibits

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

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

For more information on exhibiting and sponsorship opportunities, please visit the Exhibitor page of the society's annual meeting website (2019.biomaterials.org) and download the Exhibitor and Sponsorship Prospectus or contact:

Dan Lemyre, Executive Director
(856) 642-4201
dlemyre@biomaterials.org

EXHIBIT SCHEDULE *(Tentative and subject to change)*

Wednesday, April 3, 2019

Move-In: 9:00 AM – 5:00 PM

Opening Reception in Exhibit Hall: 6:30 PM – 8:30 PM

Thursday, April 4, 2019

Exhibits Open: 10:00 AM – 1:45 PM; 3:45 PM – 8:00 PM

Exhibit Reception & Poster Session I: 6:30 PM – 8:00 PM

Friday, April 5, 2019

Exhibits Open: 10:00 AM – 1:45 PM; 3:45 PM – 5:15 PM

Poster Session II: 3:45 PM – 5:15 PM

Tear Down: 5:30 PM – Midnight



TRANSPORTATION

SEATTLE-TACOMA INTERNATIONAL AIRPORT

The Seattle-Tacoma International Airport (SEA) is located approximately 15 miles from downtown Seattle.

AIRPORT TRANSPORTATION OPTIONS

There are several forms of transportation available for getting from the Seattle-Tacoma International Airport to downtown Seattle, where the Washington State Convention Center is located.

Cab

Readily available outside the Seattle Airport terminals, the cabs are metered, with set fees for journeys to the central business district. Please note that due to state law, taxicabs are obliged to collect sales tax on all fares. Downtown Seattle is approximately 15 minutes from the airport, with fares averaging \$30-\$40

Train Services

Sound Transit's Link light rail makes trips from Angle Lake Station to the University of Washington through downtown Seattle making 14 stops along the way, including downtown Seattle and Sea-Tac Airport. Trains arrive every 6-15 minutes, depending on the time of day, and take about 40 minutes to travel between Sea-Tac International Airport and Westlake Station in downtown Seattle. One-way fare for adults ranges from \$2.25 to \$3.25. Schedules and station maps are available on the Sound Transit website.

Ride Share

At Sea-Tac Airport, taxis and ride-sharing companies (Uber, Lyft, & Sidecar) are available on the third floor of the parking garage. One-way rides between the airport and downtown range from \$40-\$55.

VISITOR INFORMATION

LOCAL ATTRACTIONS

Popular attractions located in close proximity to the Washington State Convention Center:

- The Space Needle
- The Seattle Art Museum
- Boeing Factory and Future of Flight Aviation Center
- The First Starbucks
- Pike Place Market
- CenturyLink Field
- Safeco Field
- Pacific Science Center

Additional information and resources are available on the travel page of the 2019 SFB website:

2019.biomaterials.org/travel

REGISTRATION FORM



SOCIETY FOR BIOMATERIALS

THE PINNACLE OF BIOMATERIAL INNOVATION AND EXCELLENCE

REGISTRATION

(Please print or type)

FIRST NAME _____ SURNAME/LAST NAME _____

TITLE _____ DEGREE _____

SPECIALITY OR DISCIPLINE _____

AFFILIATION _____ DEPARTMENT _____

ADDRESS _____

CITY _____ STATE/PROVINCE _____ ZIP/POSTAL CODE _____ COUNTRY _____

TELEPHONE _____ FACSIMILE _____

**** FOR INTERNATIONAL NUMBERS, PLEASE INCLUDE COUNTRY AND CITY CODES. ****

EMAIL _____ SPECIAL REQUESTS (ADA, DIETARY, ETC.) _____

MEMBER IN WHICH SOCIETY? SOCIETY FOR BIOMATERIALS, USA OTHER WBC SOCIETY (LIST) _____ MEMBER NUMBER _____

3 OPTIONS TO REGISTER: 1. Online at www.biomaterials.org 2. Fax form to (856) 439-0525 3. Mail to 1120 Route 73, Suite 200, Mt. Laurel, NJ 08054	ON OR BEFORE MARCH 16, 2019								AFTER MARCH 16, 2019							
	REGISTRATION FOR PAID MEMBERS				REGISTRATION FOR NON-MEMBERS				REGISTRATION FOR PAID MEMBERS				REGISTRATION FOR NON-MEMBERS			
	Member	Post Grad	Student	Retired Senior	Non-Member	Non-Member Post Grad	Non-Member Student	Retired Senior	Member	Post Grad	Student	Retired Senior	Non-Member	Non-Member Post Grad	Non-Member Student	Retired Senior
Meeting & Exhibit Registration	<input type="checkbox"/> \$635	<input type="checkbox"/> \$465	<input type="checkbox"/> \$300	<input type="checkbox"/> \$160	<input type="checkbox"/> \$970	<input type="checkbox"/> \$685	<input type="checkbox"/> \$450	<input type="checkbox"/> \$160	<input type="checkbox"/> \$785	<input type="checkbox"/> \$515	<input type="checkbox"/> \$330	<input type="checkbox"/> \$160	<input type="checkbox"/> \$1130	<input type="checkbox"/> \$735	<input type="checkbox"/> \$480	<input type="checkbox"/> \$160
WORKSHOPS & TOUR • WEDNESDAY, APRIL 3, 2019									ON OR BEFORE MARCH 16, 2019				AFTER MARCH 16, 2019			
									PAID MEMBERS		NON-MEMBERS		PAID MEMBERS		NON-MEMBERS	
WORKSHOP 1	Biomaterials in Science Excellence and Technology Translation Workshop 8:00 am – 10:00 am								<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50				
WORKSHOP 2	New Directions in Biomedical Surface Analysis 8:00 am – 10:00 am								<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50				
WORKSHOP 3	Recent Advances in 3D Printing of Biomaterials 10:00 am – 12:00 N								<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50				
WORKSHOP 4	Active Biomaterials 10:00 am – 12:00 N								<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50	<input type="checkbox"/> \$50				
WORKSHOP 5	Communication and Networking for Biomaterials Professionals 10:00 am – 12:00 N								<input type="checkbox"/> \$0	<input type="checkbox"/> \$0	<input type="checkbox"/> \$0	<input type="checkbox"/> \$0				
TOUR	University of Washington 8:30 am – 12:30pm <i>* Lunch Provided, Limited to first 50 registrants</i>								<input type="checkbox"/> \$25	<input type="checkbox"/> \$25	<input type="checkbox"/> \$25	<input type="checkbox"/> \$25				
PAID MEMBERS ONLY, ON OR BEFORE MARCH 16, 2019																
Include Dues Renewal	Member		Post Grad		Student		Retired Senior									
	<input type="checkbox"/> \$215		<input type="checkbox"/> \$120		<input type="checkbox"/> \$50		<input type="checkbox"/> \$0									

- Under-Represented Minority Mixer \$10**
Wednesday, April 3, 2019
08:30pm – 09:30pm
- Women in Biomaterials Lunch \$25**
Thursday, April 4, 2019
12:30 pm – 1:30 pm
- Young Scientists Happy Hour & Trivia Game Night \$10**
Thursday, April 4, 2019
08:00pm – 09:00pm
- Student Luncheon \$5**
Friday, April 5, 2019
12:30 pm – 1:30 pm
- LGBTQI & Friends Mixer \$10**
Friday, April 5, 2019
06:00pm – 07:00pm

TRANSACTION & SOCIAL REGISTRATION

(Please print or type)

Optional Transactions

- Transactions Book QTY: _____
 \$100 Member \$125 Non-Member

Guest Registration

Includes Opening Reception, Exhibition Reception and Bash

- Extra tickets for Accompanying Guest(s) **\$75 each**

Name of guest(s): _____ QTY: _____

* Student and Post-Graduate status verification required.

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

SIGNATURE OF ADVISOR
OR DEPARTMENT CHAIR

ADVISOR'S PRINTED NAME

ADVISOR'S
TELEPHONE

ADVISOR'S
EMAIL

New & Renewing Members ONLY:

Add Membership including *Journal of Biomedical Materials* (E-Journal)

- Active **\$215** Student (with subscription) **\$85**
 Post-Grad **\$120** Student (no subscription) **\$50**

Additional Publications (Optional)

Acta Biomaterialia **\$186 plus VAT where applicable**

Biomaterials **\$324 plus VAT where applicable**

The Journal of Biomaterials Science (Polymers Edition) **\$344** **\$172**
Print Online

Biomedical Materials **\$115**

Special Interest Group (\$15 for each, free for students)

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

REGISTRATION
SUBTOTAL (FROM PAGE 1): \$

TRANSACTION & SOCIAL
REGISTRATION SUBTOTAL (FROM ABOVE): \$

TOTAL
DUE: \$

METHOD OF PAYMENT

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

NAME
(AS IT APPEARS ON CARD)

CARD
NUMBER

EXP.
DATE

CARDHOLDER SIGNATURE

Completed forms should be sent to Jeana Hoffman.

Fax to (856) 439-0525

OR

Mail to 1120 Route 73, Suite 200 Mt. Laurel, NJ 08054

Nanomaterials SIG Forum Update

NANOMEDICINE TRAINING OPPORTUNITIES AT NORTHEASTERN UNIVERSITY

By Anne L. van de Ven-Moloney, PhD, Research Assistant Professor, Department of Physics, and Assistant Director, Nanomedicine Science and Technology Center, Northeastern University



INTRODUCTION

Nanomedicine is a rapidly expanding, interdisciplinary field that seeks to develop new and improved nanotechnologies for the screening, diagnosis, treatment and prevention of disease. Today, more than 50 different nanomedicines are used to treat patients suffering from a range of disorders, including cancer, infectious disease, kidney dysfunction, iron deficiency, multiple sclerosis and chronic inflammation. Nanomedicine has been recognized as a national priority by the National Institutes of Health (NIH) since 2003¹ and continues to be considered one of the fastest-growing occupations by the U.S. Bureau of Labor Statistics.² Despite this tremendous growth potential, there are few

opportunities for students to receive training in nanomedicine, since nanomedicine research generally requires close proximity between research universities and hospitals in large metropolitan areas. As of 2018, only five higher institutions in the United States offered degree programs in nanomedicine. This presents a clear opportunity for innovative leaders, such as Northeastern University, to develop new ways to make nanomedicine training more accessible to students.

ESSENTIAL KNOWLEDGE AND SKILLS FOR STUDENTS

Acquisition of interdisciplinary knowledge and skills is essential for nanomedicine student success and for future growth of the field (Figure 1). To synthesize novel and effective

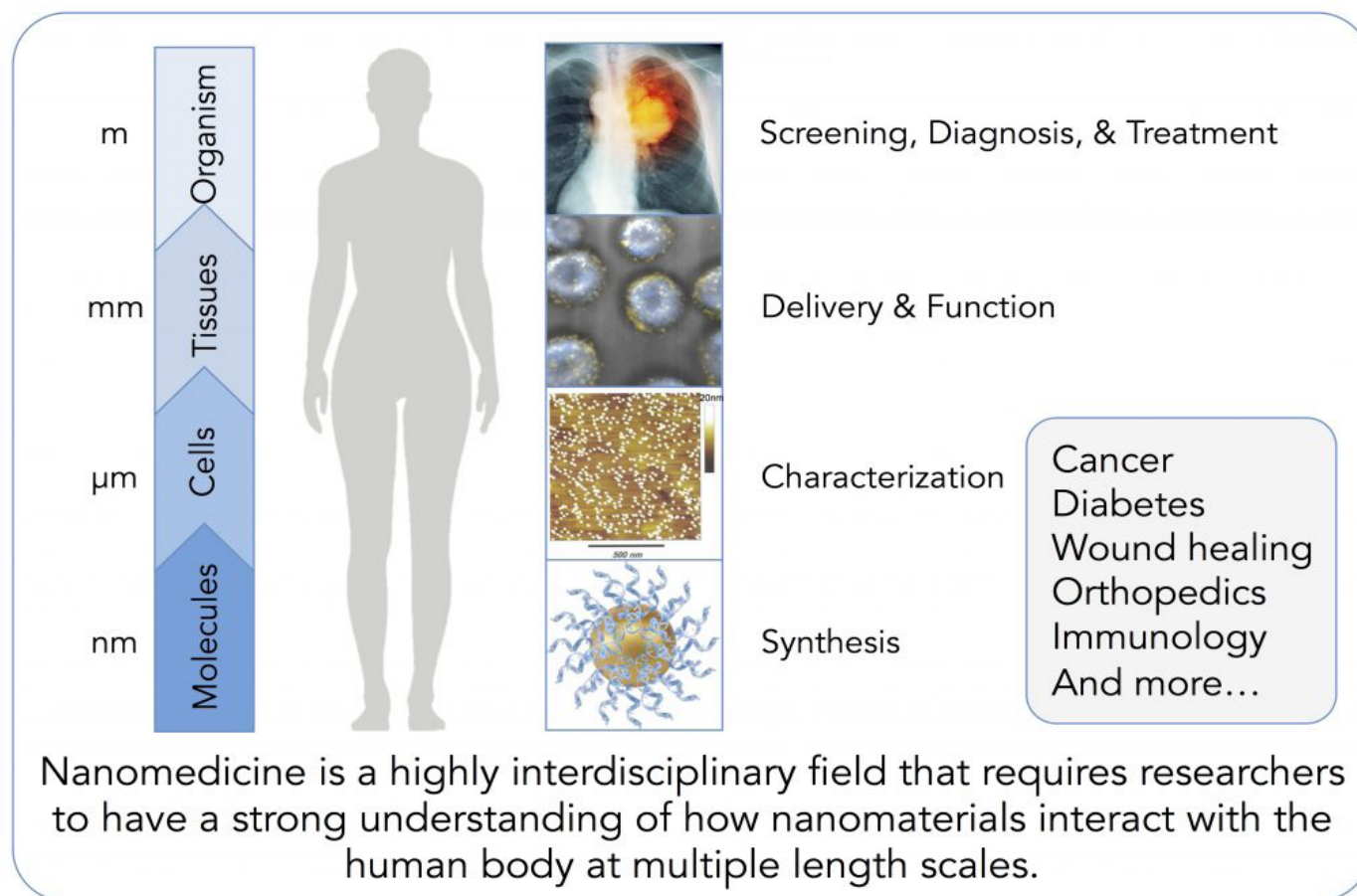


Figure 1: Nanomedicine is a highly interdisciplinary field that requires researchers to have a strong understanding of how nanomaterials interact with the human body at multiple length scales.

Nanomaterials SIG Forum Update (continued)

"OF THE 50+ STUDENTS FROM 10 DIFFERENT STEM DISCIPLINES WHO COMPLETED THIS PROGRAM, 43 PERCENT PURSUED NANOMEDICINE CAREERS AFTER GRADUATION. "

nanomedicines, students must first be educated about how basic building blocks assemble at the nanoscale to create unique and distinctive features that are not possible with bulk materials. Students must then be trained to characterize in vitro how these nanomaterials interact with biological structures at the molecular and cellular scale, which is the basis for why nanomaterials have found widespread use for biomedical research and applications. A variety of tools exist to characterize, optimize and predict nanomaterial interactions with cells and molecules. Upon validation in vitro, nanomaterials are tested in vivo to better understand how their delivery and function impacts short-term and long-term tissue behavior. Therefore, it is also essential for nanomedicine students to learn to perform specialized nanomedicine studies in animal models. Ultimately, nanomedicine students should develop into uniquely skilled researchers who will use interdisciplinary approaches to develop novel nanomaterials that can be proven to be both safe and effective in preclinical through to clinical trials and that can be used for improved screening, diagnosis and treatment of disease.

AT NORTHEASTERN UNIVERSITY, NANOMEDICINE RESEARCH TRAINING STARTS AT THE UNDERGRADUATE LEVEL

Undergraduate research is recognized as a high-impact practice that promotes persistence in college,^{3,4} pursuit of graduate programs^{5,6} and a commitment to STEM careers.⁶⁻¹⁰ With support from the NIH National Cancer Institute, Northeastern University and Dana-Farber/Harvard Cancer Center jointly established an undergraduate research training program in cancer nanomedicine called Cancer Nanomedicine Co-ops for Undergraduate Research Experiences (CaNCURE). CaNCURE was founded on the hypothesis that mentored research experiences in a rich educational environment providing intellectual immersion in cancer nanomedicine would motivate young scientists and engineers to consider a career in this field. Since 2014, CaNCURE has successfully placed 75 undergraduates in cancer nanomedicine laboratories across the Boston area. This program has drawn trainees from 12 different fields of study, more than half of whom have continued to work in their CaNCURE laboratory after co-op completion. Today, nearly two-thirds of program alumni are actively involved in cancer nanomedicine research as part of a new co-op (students) or full-

time job (graduates), and one-third of alumni have published peer-reviewed manuscripts in cancer nanomedicine. The success of this program suggests that cancer nanomedicine research is a highly desirable and stimulating career path for undergraduates from broad range of STEM disciplines.

GRADUATE-LEVEL NANOMEDICINE EDUCATION AND TRAINING AT NORTHEASTERN UNIVERSITY

The National Science Foundation (NSF)-sponsored Integrative Graduate Education and Research Traineeship nanomedicine program at Northeastern University was established in 2005 and competitively renewed in 2010. It is an example of a successful doctoral-level training program in nanomedicine.¹¹ Established in response to a solicitation from NSF to develop broad-based graduate education programs centered on an interdisciplinary research theme, trainees in this two-year specialization program completed thesis research and course work in nanomedicine while continuing to acquire deep knowledge in their chosen doctoral discipline. Of the 50+ students from 10 different STEM disciplines who completed this program, 43 percent pursued nanomedicine careers after graduation. Given that all of these students completed a doctoral degree in a traditional STEM discipline, not nanomedicine, this statistic is especially astounding.

In 2015, Northeastern received an NSF Innovation in Graduate Education award to establish the Nanomedicine Academy of Minority Serving Institutions. Using the latest learning pedagogies and teaching technologies, combined with a custom, scalable platform for interactive synchronous and asynchronous content delivery, the Academy has created a "national nanomedicine classroom" that includes Morgan State University, Tuskegee University, Florida International University and University of Puerto Rico Mayaguez. Students at these partner institutions receive course credit toward their home degree while remotely attending courses and participating in collaborative course activities with Northeastern students. A total of five nanomedicine courses have been developed to date, offering students the opportunity to (1) learn, practice and reflect on enabling innovations in nanomedicine; (2) teach peers about exciting new research using a flipped classroom setting; (3) conduct research experiments using remotely operated

Nanomaterials SIG Forum Update (continued)

instruments in a live online laboratory setting; (4) create a virtual startup company under the mentorship of biotech industry experts; and (5) hear firsthand accounts of nanomedicine research and innovations from guest experts. Today, these blended courses are simultaneously attended by ~90 students per semester from 18 different STEM disciplines, with ~67 percent of students classified as underrepresented minorities (URM) by race or ethnicity. Over two-thirds of remote URM students have completed three or more nanomedicine courses, attesting to the unique value these courses add to degree programs in low-resource settings.

LESSONS LEARNED

There is clear demand for nanomedicine training among university students at both the undergraduate and graduate levels. Due to its interdisciplinary nature, nanomedicine is appealing to students in many different STEM disciplines, particularly students in low-resource settings. Students who receive training in nanomedicine are likely to persist in this field, opening new opportunities for broadening participation in nanomedicine careers. Creating successful nanomedicine training programs can be challenging, since this is often the first time students are learning and collaborating in a true interdisciplinary setting. Academic institutions and research hospitals that can overcome such training challenges have the opportunity to play a formative role in the development of the future nanomedicine workforce.

ACKNOWLEDGEMENTS

The author of this report acknowledges **Dr. Srinivas Sridhar**. At Northeastern University, he is the director of the Nanomedicine Science and Technology Center and a Distinguished Professor of Physics, Bioengineering and Chemical Engineering. Many thanks also go to **Dr. Eno Ebong**, assistant professor of chemical engineering, bioengineering and biology at Northeastern University. Dr. Ebong is one of the faculty members who is affiliated with and trains students at the Nanomedicine Science and Technology Center. Dr. Ebong is also the SFB Nanomaterials SIG *Biomaterials Forum* reporter. This report was written in response to Dr. Ebong's invitation.

REFERENCES:

1. Zerhouni E. The NIH roadmap. *Science*. 2003;302(5642):63-72.
2. Lacey TA, Toossi M, Dubina KS, Gensler AB. Projections overview and highlights, 2016–26. *Monthly Labor Review*. October 2017. <https://www.bls.gov/opub/mlr/2017/article/projections-overview-and-highlights-2016-26.htm>. Accessed January 25, 2019.
3. Kuh GD. High-impact educational practices: what they are, who has access to them, and why they matter. <https://provost.tufts.edu/celt/files/High-Impact-Ed-Practices1.pdf>. Published 2008. Accessed January 25, 2019.
4. Thiry H, Laursen SL, Hunter A. What experiences help students become scientists? A comparative study of research and other sources of personal and professional gains for STEM undergraduates. *J Higher Educ*. 2011;82(4):357-388.
5. Barlow AEL, Villarejo M. Making a difference for minorities: evaluation of an educational enrichment program. *J Res Sci Teach*. 2004;41(9):861-881.
6. Lopatto D. Survey of undergraduate research experiences (SURE): first findings. *Cell Biol Educ*. 2004;3(4):270-277.
7. Seymour E, Hunter A, Laursen SL, DeAntoni T. Establishing the benefits of research experiences for undergraduates in the sciences: first findings from a three-year study. *Sci Ed*. 2004;88(4):493-534.
8. MacLachlan AJ. Developing graduate students of color for the professoriate in science, technology, engineering, and mathematics (STEM). https://cshe.berkeley.edu/sites/default/files/publications/2006_developing_graduate_students_of_color_for_the_professoriate_in_science_technology_engineering_and_mathematics_stem.pdf. Published March 2006. Accessed January 25, 2019.
9. Hunter A, Laursen SL, Seymour E. Becoming a scientist: the role of undergraduate research in students' cognitive, personal, and professional development. *Sci Ed*. 2007;91(1):36-74.
10. Russell SH, Hancock MP, McCullough J. Benefits of undergraduate research experiences. *Science*. 2007;316(5824):548-549.
11. van de Ven AL, Shann MH, Sridhar S. Essential components of a successful doctoral program in nanomedicine. *Int J Nanomedicine*. 2015;10:23-30.

Tissue Engineering Is Moving Beyond Creating Tissue Substitutes for *in vivo* Transplantation

By Shilpa Sant, Department of Pharmaceutical Sciences, Department of Bioengineering, McGowan Institute for Regenerative Medicine, University of Pittsburgh

The past few decades of tissue engineering research were focused on building new biomaterials with controlled chemical, mechanical and architectural properties and studying how cells perceive and interact with these various aspects. Mechanistic understanding from these studies and cutting-edge technologies such as 3D bioprinting have taken tissue engineers closer to creating complex tissue structures *in vitro* to faithfully mimic *in vivo* tissue structures. Progress in the field of tissue engineering has further fostered multidisciplinary interactions among materials scientists, chemists, biologists and even clinicians, thus moving the field closer to the clinical translation. As a result, we have witnessed many scientific and technological advances in biofabrication, 3D bioprinting and more, along with many emerging thrust areas, such as advanced biomanufacturing, immunomodulation and precision medicine. Current technological advancements have expanded the field of tissue engineering beyond just creating tissue substitutes for *in vivo* transplantation.

There has been tremendous interest in exploiting tissue engineering strategies to develop *in vitro* biomimetic tissue and organ models. These include scaffold-free and scaffold-based strategies that range from organoid models to organ-on-chip-based platforms. These model systems extend beyond cancer to other diseases, including diabetes, osteoarthritis, diseases affecting the brain or kidney, and diseases affecting pulmonary, cardiovascular and other organ systems. Tissue-engineered model systems have also broken barriers of cell sources and are not limited to cell lines only. In fact, tissue-engineered model systems are incorporating patient-derived primary cells, human pluripotent stem cells and genome engineering tools available to tissue engineers to recapitulate various cell phenotypes and functions of normal and diseased tissues. Thus, organoids and organ-on-chip-based platforms have great potential to advance fundamental research into disease mechanisms. These platforms can also improve the prediction of drug safety and efficacy in humans and reduce the number of animal models in preclinical settings. Hence, they have captured the attention of the medical, pharmaceutical, chemical and cosmetics industries and government regulatory agencies for drug discovery, drug safety/toxicity screening and personalized medicine. These are truly exciting times to be a tissue engineer!

THE TISSUE ENGINEERING SIG IS KEEPING UP WITH THESE EXCITING OPPORTUNITIES!

Indeed, these emerging state-of-the-art, interdisciplinary opportunities are also impacting our Tissue Engineering SIG in terms of membership and technical sessions offered at the Society For Biomaterials Annual Meeting.

Membership

Tissue Engineering SIG membership has grown to more than 650 active members working in academia, industry and government settings. Although the majority of members are affiliated with academia (faculty, post-docs and students), it is heartening to see decent industry presence in the SIG. Our members are working in many diverse fields, developing biomaterials and their applications, advancing biomanufacturing and bioprinting technologies, and extending into translation and commercialization! However, we still need to work on improving presence from the government sector in our membership.

Technical Sessions at the 2018 Annual Meeting

The SIG sponsored nine technical sessions in various areas of biomaterials development and applications. These sessions received more than 200 abstracts and covered broader areas of regenerative engineering, immunomodulation and interfacial tissue engineering. Podia and poster presentations covered soft and hard tissues and organ systems, from musculoskeletal to cardiovascular. Many talks and poster sessions covered the emerging field of disease modeling, spanning cardiovascular, brain and musculoskeletal systems. Although abstracts dominated in modeling cancer as a disease, presentations explored Alzheimer's disease, valvular calcification, osteoarthritis and diabetes. Technical sessions also covered drug delivery and immunomodulation strategies to target some of these pathological processes.

Keeping up with emerging technologies and opportunities for tissue engineers, the Tissue Engineering SIG again sponsored a session on 3D bioprinting and a new technical session that covered biomaterial technologies for the rapidly emerging precision medicine field. We were excited to see incredible interest in these sessions, with both rooms beyond full capacity.

Tissue Engineering Is Moving Beyond Creating Tissue Substitutes for in vivo Transplantation (continued)

Student Poster Awards

To encourage our student members, the Tissue Engineering SIG offered student poster awards at the 2018 Annual Meeting. These were chosen at the meeting and announced at the Tissue Engineering SIG Session 2 on April 14. We would like to congratulate our Tissue Engineering SIG student poster award winners:

First Place: "Self-assembled nanocomposite hydrogels driven by bisphosphonate-Mg²⁺ coordination regulate the differentiation of encapsulated stem cells and promote in-situ bone regeneration," K. Zhang, the Chinese University of Hong Kong, Hong Kong

Second Place: "Optimizing 3D printability in NICE bioinks through compositional and rheological analysis," D. Chimene, Texas A&M University, College Station, Texas

Third Place: "Polymer scaffolds protect mice against diet-induced obesity and glucose intolerance," M. Hendley, University of South Carolina, Columbia, South Carolina

Social Mixer

This year, the Tissue Engineering SIG joined forces with the Orthopedic Biomaterials SIG for a social mixer. About 50 to 60 members gathered for the mixer, which provided an excellent opportunity for networking and exchange of ideas among attendees in and outside the SIG.

WE ARE LOOKING FORWARD TO A GREAT ANNUAL MEETING IN 2019 AT THE WASHINGTON STATE CONVENTION CENTER IN SEATTLE, WASHINGTON!

We would like to thank all members who attended and presented at the 2018 Annual Meeting. We are excited to see new advances at the 2019 Annual Meeting and plan to offer student poster awards again this year. We sincerely hope that those who could not attend the 2018 meeting will consider attending the 2019 meeting in Seattle! Please feel free contact Tissue Engineering SIG chair, Syam Nukavarapu, PhD, with any questions and suggestions.

"OUR MEMBERS ARE

WORKING IN MANY DIVERSE

FIELDS, DEVELOPING

BIOMATERIALS AND THEIR

APPLICATIONS, ADVANCING

BIOMANUFACTURING

AND BIOPRINTING

TECHNOLOGIES, AND

EXTENDING INTO

TRANSLATION AND

COMMERCIALIZATION!"

Industry News

By Steve Lin, Industry News Editor



Boston Scientific Corporation

(Marlborough, Massachusetts) announced that it has acquired the remaining shares of [Millipede, Inc.](#), a privately held company in Santa Rosa, California, upon its recent successful completion of a first-in-human clinical study. The

acquisition will expand the Boston Scientific Structural Heart portfolio to include the IRIS Transcatheter Annuloplasty Ring System, which is in development for the treatment of patients with severe mitral regurgitation who are not able to tolerate open heart surgery. Under the initial agreement with Millipede, Boston Scientific purchased \$90 million in Millipede shares, with the option to acquire the company's remaining shares for \$325 million at closing, with a \$125 million payment becoming available upon achievement of a commercial milestone. The quickly expanding transcatheter mitral repair and replacement market is estimated to reach \$1 billion by 2021, with the majority comprised of repair procedures.

Venus Medtech (Hangzhou, China) Inc., the preeminent Chinese transcatheter heart valve company, announced it has closed its merger with Keystone Heart Ltd. (Caesarea, Israel), a privately held medical device company and maker of TriGUARD 3. The merger provides Venus Medtech with TriGUARD 3, the first cerebral embolic protection device designed to provide complete coverage to all brain regions for patients undergoing cardiac procedures, as well as an established clinical and commercial organization in both the United States and Europe. The company is currently enrolling patients in the REFLECT trial in the United States to evaluate TriGUARD 3, anticipating enrollment completion in the early part of Q1 2019 and Food and Drug Administration (FDA) approval in Q3 2019. CE mark approval for Europe is anticipated by the end of Q1 2019.

Omron Healthcare (Lake Forest, Illinois), the number one doctor- and pharmacist-recommended blood pressure monitor brand, started the sale of its new HeartGuide, the first wearable blood pressure monitor, on December 20 in the United States on OmronHealthcare.com. HeartGuide, an oscillometric blood pressure monitor in the design of a wrist watch, was recently cleared by the FDA for availability as a personal medical device. HeartGuide functions as a digital wrist watch and uses oscillometric measurement through an innovative design — a cuff in the watch band inflates to measure clinically accurate systolic

and diastolic pressure. The oscillometric method is the FDA-recognized standard for accurate, automated, medical-grade personal blood pressure measurement. Omron filed more than 80 new patents in pioneering new components for HeartGuide.

ConMed Corporation (Utica, New York) announced a definitive agreement to acquire privately held **Buffalo Filter LLC** for \$365 million on a cash-free, debt-free basis. The transaction is expected to be financed through a combination of new convertible notes and an expanded and amended credit facility. The transaction is expected to close in Q1 2019. Founded in 1991, Buffalo Filter, part of Filtration Group, is the market leader in surgical smoke evacuation technologies. The company's comprehensive product portfolio includes smoke evacuation pencils, smoke evacuators and laparoscopic solutions.

Medtronic will [pay a total of nearly \\$51 million](#) to resolve three legal claims against [Covidien](#) and [ev3 Inc.](#), two companies that are now part of the Ireland-based medtech company. Medtronic itself had no role in the wrongdoings that resulted in the multimillion fines. According to the U.S. Department of Justice (DOJ), the payments [resolve charges against the companies owned by Medtronic](#) that they made false claims about devices and engaged in kickback schemes to promote unauthorized use of the devices. ev3 was purchased by Covidien plc in 2010 and became part of Medtronic when Medtronic acquired Covidien in 2015. As part of the agreement, ev3 agreed to plead guilty to a misdemeanor and pay the settlement. Medtronic will make a series of three payments to settle the allegations.

The **FDA** has [warned Genetech, Inc.](#) of San Diego, California, and its president, Edwin N. Pinos, for marketing stem cell products without FDA approval and for significant deviations from current good tissue practice and current good manufacturing practice requirements, including some violations that may have led to microbial contamination, potentially causing serious blood infections in patients. Genetech processed umbilical cord blood into unapproved human cellular products, which were distributed by Liveyon, LLC. In addition, as part of the FDA's overall goal to support the responsible development of safe and effective products for patients, the agency is sending letters to reiterate the FDA's compliance and enforcement policy to other manufacturers and healthcare providers who may be offering stem cell treatments.

Industry News (continued)

As the Trump administration has continued to show its lack of financial support of scientific research using fetal tissue, **the National Institutes of Health** (NIH) is setting aside \$20 million to fund research that could develop alternatives to the use of embryonic tissue. NIH announced that it is inviting applications to “develop and/or further refine human tissue models that closely mimic and can be used to faithfully model human embryonic development or other aspects of human biology.” NIH said that it is seeking the funding so it will not have to rely on the use of human fetal tissue obtained from elective abortions. In its announcement, NIH said that the models that mimic fetal tissue could include “cell culture models using induced pluripotent stem cells (iPSC), iPSC-derived organoids, or other three-dimensional culture systems.”

Actelion Pharmaceuticals, a division of [Johnson & Johnson](#), will pay \$360 million to settle claims that it illegally used a foundation to pay copay payments for some Medicare patients who were taking the company’s pulmonary arterial hypertension drugs. The DOJ said the company illegally used the foundation to cover copay costs for thousands of patients in violation of the False Claims Act. The federal anti-kickback statute prevents pharmaceutical companies from providing financial coverage of those copay payments. The government said that Actelion used the nonprofit foundation “as an illegal conduit to pay the copay obligations of thousands of Medicare patients” who were taking its pulmonary arterial hypertension treatments, which include Tracleer, Ventavis, Veletri and Opsumit.

**ATTENTION
MEMBERS!**

**WE WOULD LOVE
TO HEAR FROM YOU.**

IF YOU HAVE NEWS TO SHARE WITH FORUM READERS,
LET US KNOW. EMAIL YOUR NEWS AND ANY PHOTOS
TO INFO@BIOMATERIALS.ORG AND YOU COULD BE
FEATURED IN THE NEXT ISSUE.

Funding Lottery

COULD GRANT LOTTERIES SOLVE THE MESS FOR SCIENCE FUNDING?

We might be better off funding scientific research by choosing projects at random, according to Kelsey Piper, Vox news staff writer. Here are some excerpts from the article.

Nearly all academic researchers in the sciences rely on outside grants in order to pay salaries and buy their equipment. But that pool of funding is shrinking, grant approval rates are dropping, and researchers are stuck spending more and more of their time and energy applying for grants. Many scientists are saying that the system is broken and the consequences could be disastrous.

By some estimates, many top researchers spend 50 percent of their time writing grants. Interdisciplinary research is less likely to get funding, meaning critical kinds of research don't get done. And scientists argue that the constant fighting for funding undermines their work, by encouraging researchers to overpromise and engage in questionable practices, over-incentivizing publication in top journals, disincentivizing replications of existing work, and stifling creativity and intellectual risk-taking.

What if we gave up on the whole grant application process and distributed grant money by lottery?

Yes, that's a serious proposal. It was first put forward in 2016 in mBio, a journal by the American Society for Microbiology.

Our current grant review process doesn't select the best proposals, by a long shot. One study found very little correlation between how a grant was scored and whether the research it produced was cited. Another, looking at high-quality proposals, found there was virtually no agreement on their merits — two different researchers might come to vastly different conclusions about whether the grant should be approved. Another analysis looked at successful grants and found that 59 percent of them could have been rejected due to random variability in scoring. Clearly, above some threshold, the process is deeply subjective and not a real measure of quality.

So what if reviewers were merely responsible for deciding whether the papers are above the threshold for immediate rejection? Papers below that threshold then get rejected. Papers above the threshold enter the lottery and grants are awarded at random.

It's a bizarre idea. But it could solve some of the most urgent problems with the modern grant system.

"Overall, our funding system is turning scientists into entrepreneurs and managers, and forcing them into roles they have not trained for, never wanted as a career, and which requires a very different mindset than doing science," an article in the Canadian Journal of Kidney Health and Disease argued. Some researchers, starved of public funding, are soliciting funding from private industry instead. That, of course, can create its own problems. Last year, the NIH halted a study into the health benefits of alcohol after learning that the researchers and officials had approached the alcohol industry for funding, implying that the results would be supportive of alcohol consumption. Now they're scrambling to set guidelines for scientists taking industry funding, to ensure they're still conducting honest science. The difficulty of getting grants creates a culture where researchers feel that their ability to keep doing science at all — and pay the employees in their lab — depends on their success at squeezing results out of their data. That makes it hard to admit when the data is ambiguous and rewards researchers who are more willing to leap to conclusions or cut corners.

There's a growing awareness, in academia and in public, that science is in the middle of a replication crisis — many published results don't stand up to scrutiny. It's possible to use common statistical methods to find exciting "results" even in data that's just noise. A lot of things drive the replication crisis, but the endless race for funding is certainly one of them. You usually can't get grants to replicate research, so scientists have to do something new rather than checking on important existing results that might be wrong.

But you can't do anything too new, either — interdisciplinary research (collaboration across academic departments) is harder to get funding for, which has researchers shying away from it. In general, the pressure to get funding creates incentives for researchers to use shoddy methods and overstate what they can do.

Grant applications are also consuming researchers' lives. We put more than a decade into training a new PhD in the sciences, and we've often put three decades into training a scientist at the top of their field and running a research lab. Their time is really valuable, and we'd like to see them spend it doing science. Instead, they increasingly spend it writing grant applications. One observational study looked at Australian scientists to check how much time they spend on grants. "An estimated 550 working years of the researchers' time was spent preparing proposals for Australia's major health and medical funding scheme," the study found. "As

Funding Lottery (continued)

success rates are historically 20–25%, much of this time has no immediate benefit to either the researcher or society, and there are large opportunity costs in lost research output.”

Furthermore, all that time and effort doesn't even help the best grants rise to the top. Among grant proposals that are already pretty good, ratings are highly subjective — two scientists will arrive at profoundly different evaluations of the same grant. That means whether one is approved or rejected is mostly a matter of chance. One study evaluated this by asking peer reviewers to review high-quality NIH grant applications as if they were making a grant decision. They computed the inter-rater reliability of the reviewers — that is, how strongly their judgment was correlated.

An inter-rater reliability of above 0.7 is considered pretty good. The inter-rater reliability for grant evaluations? Near zero.

“The available evidence suggests that the system is already in essence a lottery without the benefits of being random,” conclude Ferric C. Fang and Arturo Casadevall, the authors of the proposal in mBio.

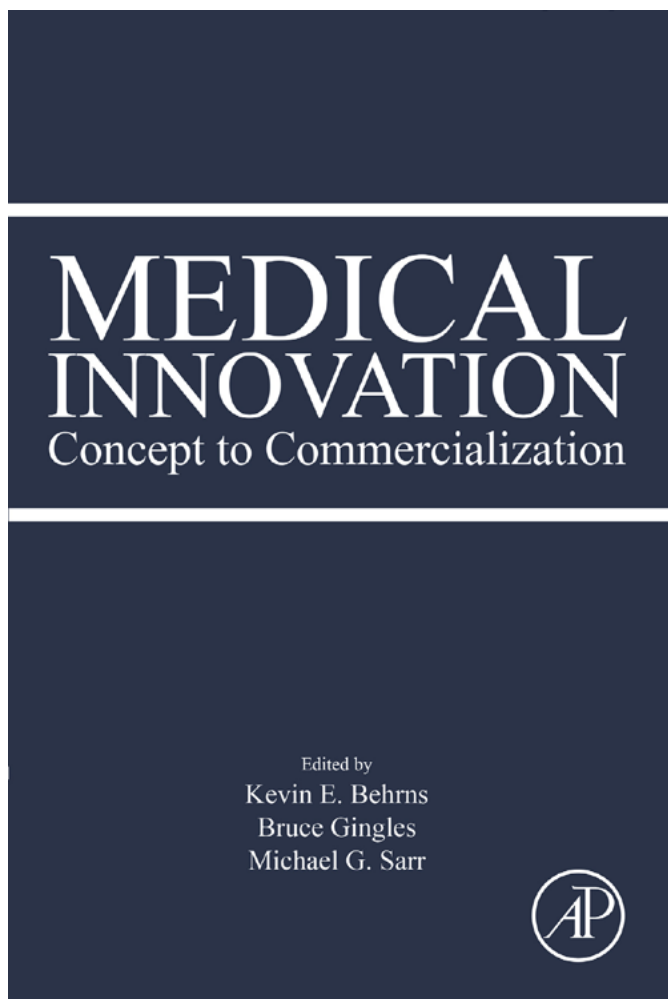
You can read the article in its entirety at: <https://www.vox.com/future-perfect/2019/1/18/18183939/science-funding-grant-lotteries-research>.

HAVE A **LETTER TO
THE EDITOR, BOOK
RECOMMENDATION
OR COVER ART**
TO SHARE WITH
FORUM READERS?

PLEASE CONTACT
Guigen Zhang at
guigen.bme@uky.edu.

Book Review

By Lynne Jones, Book Review Editor



Behrns KE, Gingles B, Sarr MG. *Medical Innovation: Concept to Commercialization*. Cambridge, MA: Academic Press/Elsevier; 2018.

ISBN: 978-0-12-814926-3

Academic Press is an imprint of Elsevier:

125 London Wall, London EC2Y 5AS, United Kingdom

525 B Street, Suite 1800, San Diego, CA 92101-4495, United States

50 Hampshire Street, 5th Floor, Cambridge, MA 02139, United States

The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB,

United Kingdom

© 2018 Elsevier Inc. All rights reserved.

There is something of value to every member of the Society For Biomaterials in *Medical Innovation: Concept to Commercialization*, edited by Kevin E. Behrns, Bruce Gingles and Michael Gregory Sarr. A scan of the table of contents corroborates this point:

1. Introduction to Medical Innovation, Thomas P. Stossel
2. The Basics of Business Law for New Businesses, Tom Walsh
3. Regulating Medical Devices in the United States, David E. Chadwick
4. The Role of University Technology Transfer, Jay Schrankler
5. Basics of Patent Law: Strategies for Entrepreneurs and Start-Up Enterprises, Thomas J. Filarski
6. Licensing Medical Devices to Manufacturers/Partnering With Large Companies, Mark Boden and Johnathan Goldstein
7. Understanding Venture Capital in the Health Industry, Barry S. Myers and Charles Robert Hallford
8. The Process for Innovators/Founders to Raise Capital to Start a Company, Rudy A. Mazzocchi
9. An Introduction to the National Institutes of Health SBIR/STTR Programs, Deepa Narayanan and Michael Weingarten
10. Clinical Trials for Medical Device Innovators, William D. Voorhees III and Theodore W. Heise
11. Innovating in a Rural Setting, Elizabeth Cole, James Hood, Dennis Matthews and Thomas Hobday
12. How Good Ideas Die: Understanding Common Pitfalls of Medtech Innovation, Katherine S. Blevins, Dan E. Azagury, James K. Wall, Venita Chandra, Elisabeth K. Wynne and Thomas M. Krummel
13. Managing Institutional Barriers to Entrepreneurship, Thomas R. Mackie and Eric Leuthardt
14. Concerns About the Current Pharmaphobia in the World of Innovation: Its Consequences and Risks, Thomas P. Stossel
15. Adoption of Technology: Appealing to the Hospital and Health System Value Analysis, Jenell Paul-Robinson
16. Technology Adoption: Appealing to Payers and Capturing Economic Value, Carla L. Zema
17. Market Adoption of Innovation Into the Operating Room: The "Hospital Chief Financial Officer as the Customer," Ryan D. Egeland, Zachary Rapp and Frank S. David
18. Accelerating Physician Entrepreneurship: Perspective of a Recently Graduated Medical Student, C. Corbin Frye
19. Accelerating Physician Entrepreneurship: The Perspective of a Resident Entrepreneur, Kyle Miller
20. Fostering and Expanding Diversity in the Workforce in Innovation, Priya Kumthekar and Mamta Swaroop

Book Review (continued)

21. Preparing America's Entrepreneurial Workforce: Reinventing the Medical Curriculum, Mark S. Cohen and Seth Klapman
22. A Dean's Perspective on Entrepreneurship in the University, Kevin E. Behrns and Andy Hayden
23. The Role of Medical Societies and Their Foundations in Supporting Entrepreneurs: A View From Anesthesiology, James C. Eisenach
24. Surgical Societies as Supporters of Innovation, Lee L. Sanström
25. Role of Medical Journals in Promoting Innovation, Michael G. Sarr
26. Inspiration, Perspiration, and Perseverance: An Innovator's Perspective, Josh Makower and Lyn Denend

The book is based on what one should understand before beginning the journey from innovative idea to medical application. Throughout the book, there are references to the importance of innovation to advancing healthcare, including phrases like "improving healthcare through medical technology" and having a "profound desire to make a difference." Each chapter is written as a standalone publication and would be good as a topic for discussion in a classroom or journal club or just to share with someone new to the field. I also believe that it will appeal to SFB's leadership. Let me explain why.

Chapter 21 notes that in 2015, 35 percent of first-year medical school students at the University of Michigan would be interested in curriculum regarding innovation and entrepreneurship. The authors indicate that this information would be of value not only for those wanting to be involved in innovation but also to medical students who want to use and evaluate new technologies for their future practices. They include a table of the lectures that were included in their Program to Accelerate Commercialization Education. This list and the book itself would be outstanding resources when designing a similar course.

There are several topics that are not often seen in textbooks or seminars on innovation and entrepreneurship that I found interesting. I appreciate that they included a chapter (Chapter 9) describing the National Institutes of Health's SBIR and STTR programs. These programs support funding opportunities for the federal innovation R&D arena (sbir.gov). Chapter 11 discusses "innovating in a rural setting" using the Tahoe Institute for Rural Health Research as a model, an entity that "works with healthcare professionals with limited available resources or advanced medical technology primarily from remote or rural environments to develop projects to meet their needs in a cost-effective manner." I would like to suggest Chapter 12, "How Good Ideas Die," as a must-read for anyone looking to get involved in medical innovation — it is a bit of a reality check with pragmatic advice. Chapter 20 focuses on fostering and expanding diversity in the workforce in innovation. The chapter first points out the paucity of women entrepreneurs in fields that are part of Teams of Innovation. The chapter includes examples of female role

models who have been successful. This chapter could be used as a starting point to discuss how to expand diversity for all underrepresented minorities.

I would like to invite Society For Biomaterials leadership to read chapters 23, 24 and 25, which illustrate the importance of training and providing a forum for our members concerning entrepreneurship. SFB has frequently held programs on this topic. For example, in 2006 in Pittsburgh, a panel discussion was held on "Entrepreneurship and Biomaterials/Medical Devices," organized by the Biomaterial Availability and Policy SIG. During the same Annual Meeting, an Innovation Corridor was established to provide a venue for attendees to showcase their innovations and provide a networking opportunity with others, including members of industry. This interest was also evident in last year's Annual Meeting, with a panel discussion on "Biomaterial-Based Regenerative Medicine Product Commercialization Hurdles" and the Biomaterials Technology in Industry session on "Conception to Clinical Trial: Example of Technology Development." Perhaps a strategy could be undertaken to always include tutorials, panel discussions or seminars, or we could even revisit the Innovation Corridor to educate our young and old investigators.

"I WOULD LIKE TO INVITE SOCIETY FOR BIOMATERIALS LEADERSHIP TO READ CHAPTERS 23, 24 AND 25, WHICH ILLUSTRATE THE IMPORTANCE OF TRAINING AND PROVIDING A FORUM FOR OUR MEMBERS CONCERNING ENTREPRENEURSHIP."

Chapter 25 focuses on journals and the role that they can play in highlighting innovation. While this chapter proposes that journals can publish articles regarding medical innovations, there are specific risks that are associated with this that will need to be addressed. The points made in this chapter would be great fodder for discussion with our journals' editorial boards, as well as a debate topic at our Annual Meeting.

I have not covered every chapter of this book due to space limitations, yet each one offers something of importance to understanding the process of medical innovation. I recommend this book to all SFB members.



SOCIETY FOR BIOMATERIALS 2019 ANNUAL MEETING & EXPOSITION

APRIL 2-6, 2019 • WASHINGTON STATE CONVENTION CENTER • SEATTLE, WA



THE
PINNACLE
OF BIOMATERIALS
INNOVATION AND
EXCELLENCE



Society For
Biomaterials

www.biomaterials.org