



**THE UNIVERSITY OF SOUTH DAKOTA'S
STUDENT CHAPTER OF
THE SOCIETY FOR BIOMATERIALS**



SOCIETY FOR BIOMATERIALS



Biomaterials Day
Nanomedicine and Controlled Release



**UNIVERSITY OF
SOUTH DAKOTA
BIOMEDICAL ENGINEERING**

**FRIDAY, OCTOBER 3, 2014
SIOUX FALLS, SD**

FROM THE BIOMATERIALS DAY COMMITTEE



Welcome Biomaterials Day Participants!

As representatives of the University of South Dakota's Student Chapter of the Society For Biomaterials, we would like to extend a warm welcome to all attendees of our chapter's 2014 Biomaterials Day! The theme of our conference, "Nanomedicine and Controlled Release," will focus on the advance of nanomedicine and drug delivery system.

The 2014 Biomaterials Day is a perfect forum to foster collaborations, networks and relationships to transfer knowledge from academic to industry. During the course of the day there will be technical talks from leaders in the Biomaterials field, information about the process of commercializing ideas and products, and we will end the day with success stories from industry representatives who have translated their research from development to a business.

We would like to thank the Society For Biomaterials national organization for awarding our chapter a grant to host Biomaterials Day. Our sponsors, the University of South Dakota Biomedical Engineering Department, Bose ElectroForce, South Dakota Innovation Partners and the South Dakota Biotech Association, whose generous donations helped make today possible. In particular, we would like to thank Christopher Blahna, the student in our chapter who worked hard to help organizing 2014 Biomaterials Day. Last, but not least, a very special thanks to our chapter advisor, Dr. Gopinath Mani, who is a driving force behind our chapter's success.

Thank you for attending the 2014 Biomaterials Day!

Biomaterials Day Committee

*Wei Lv (President), Jacob Miszuk (Secretary&Treasurer), Sujan Lamichhane, Jordan Anderson (Bylaws Chair), Berit Foss
University of South Dakota*

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BIOMEDICAL ENGINEERING DEPARTMENT

Biomedical engineering (BME) focuses on the application of engineering and science methodologies to the analysis of biological and physiological problems and to the development and delivery of health-care technologies.

The biomedical engineer serves as an interface between traditional engineering disciplines and living systems and may work in either direction, applying the patterns of living organisms to engineering design or engineering new approaches to human health. Both the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees are cross-disciplinary degrees. The objective of the M.S. program is to prepare a student for research and development careers in biomedical industry and for additional training at the doctoral level. The Ph.D. program will prepare a student for a career as a researcher who advances the frontiers of biomedical science and engineering with attention to generating new ideas for commercialization.



Dr. Daniel Engebretson

Chair of the Biomedical Engineering Department



Dr. Ying Deng

Associate Professor, Biomedical Engineering Department



Dr. Gopinath Mani

Assistant Professor, Biomedical Engineering Department



Dr. Hongli Sun

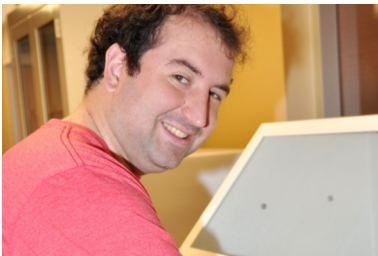
Assistant Professor, Biomedical Engineering Department

UNIVERSITY OF SOUTH DAKOTA

BIOMEDICAL ENGINEERING DEPARTMENT



The University of South Dakota's Biomedical Research Department is based in Sioux Falls at the Graduate Education and Applied Research Center (GEAR Center), 4800 N. Career Ave., Suite 221, Sioux Falls, SD 57107.



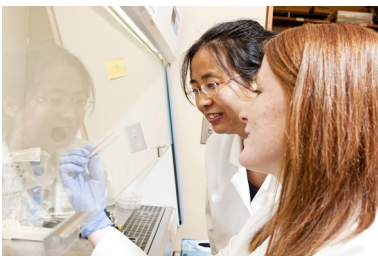
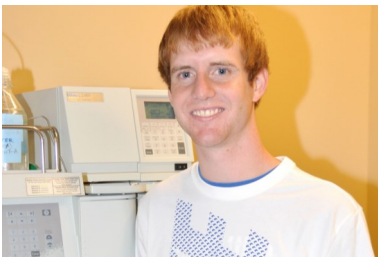
The South Dakota Public University and Research Center (University Center) is a collaboration of the South Dakota Board of Regents and all of the regental universities in the state. The GEAR Center was opened in Spring, 2009 in Sioux Falls to stimulate applied research and commercialization in South Dakota. The U's Biomedical Engineering program and Center for Research & Development of Light-activated Materials are both housed in the GEAR CENTER.

VISION

The GEAR Center is a collaborative environment where innovative solutions are sought to relevant problems and where entrepreneurship is encouraged.

FOCUS

The cohesive research focus of the GEAR Center creates a critical mass of expertise and resources, and is aligned with state priorities in biomedical and material sciences and biotechnology.



SHIFTING SOUTH DAKOTA TECHNOLOGIES INTO HIGH GEAR

- Encouraging collaborations between researchers at regental universities; other universities and colleges; government agencies; small businesses; and industries with related interests
- Developing technologies which enable biomedical/biological devices, materials, processes, and services
- Providing educational and research opportunities for graduate and post-graduate students
- Training the next wave of the state's high technology workforce



AGENDA

Time	Session	Speaker
8:00—9:00 am	Registration and Poster Setup	
9:00—9:30 am	Breakfast	
9:30—9:45 am	Welcome & Opening Remarks	Dr. Gopinath Mani, University of South Dakota
9:45—10:45 am	Keynote Speaker	Dr. Thomas J. Webster, Northeastern University “Transitioning from Nano- to Pico-Technology: Toxicity, Infection, and Tissue Growth”
10:45—11:00 am	Coffee Break	
11:00—12:20 pm	Plenary Speakers	Dr. Ram I. Mahato, University of Nebraska “Polymeric Nanomedicines of Small Molecule Drugs and miRNA for Treating Advanced Pancreatic and Prostate Cancer” Dr. Alan Young, South Dakota State University “Adjuvants: A New Class of Drug Delivery Formulations”
12:20—1: 20 pm	Lunch	
1:20—2: 50 pm	Invited Speakers: Problem Identification to Biomedical Research	Dr. Ranjit Koodali, University of South Dakota Dr. Sanku Mallik, North Dakota State University Gregory G. Bertsch, Antimicrobial Materials Inc.
2:50—3: 50 pm	Poster Presentations and Exhibition	
3:50—4: 50 pm	Invited Speakers: Regulation to Production	Kyle Hays, Medtronic Inc. Ann C. Spaans, University of South Dakota
4:50—5:00 pm	Closing Remarks & Poster Awards	Dr. Daniel Engebretson, University of South Dakota
5:00—6:00 pm	Reception with light refreshments	

KEYNOTE SPEAKER

Transitioning from Nano- to Pico-Technology: Toxicity, Infection, and Tissue Growth



THOMAS J. WEBSTER, PHD

CHAIR AND PROFESSOR,

DEPARTMENT OF CHEMICAL ENGINEERING,

NORTHEASTERN UNIVERSITY

Thomas J. Webster's (H index 63 according to Google Scholar) degrees are in chemical engineering from the University of Pittsburgh (B.S., 1995) and in biomedical engineering from Rensselaer Polytechnic Institute (M.S., 1997; Ph.D., 2000). He is currently the Department Chair and Professor of Chemical Engineering at Northeastern University in Boston.

His research explores the use of nanotechnology in numerous applications. Specifically, his research addresses the design, synthesis, and evaluation of nanophase materials (that is, materials with fundamental length scales less than 100 nm) as more effective biomedical devices. He has completed extensive studies on the use of nanophase materials to regenerate tissues and has graduated/supervised over 109 visiting faculty, clinical fellows, post-doctoral students, and thesis completing B.S., M.S., and Ph.D. students. To date, his lab group has generated over 9 textbooks, 48 book chapters, 306 invited presentations, at least 403 peer-reviewed literature articles, at least 567 conference presentations, and 32 provisional or full patents. Some of these patents led to the formation of 9 companies. His research on nanomedicine has received attention in recent media publications including MSNBC (October 10, 2005), NBC Nightly News (May 14, 2007), PBS DragonFly TV (covered across the US during the winter, 2008), ABC Nightly News via the Ivanhoe Medical Breakthrough Segment (covered across the US during the winters of 2008 and separate research segments in 2010 and 2011), Fox News (Dec. 18, 2013), and the Weather Channel (March 18, 2014). His work has been on display at the London and Boston Science Museums.

He is the founding editor-in-chief of the International Journal of Nanomedicine (the first international journal in nanomedicine which in five years has achieved an impact factor of 4.97), serves on the editorial board of 15 additional journals, has helped to organize 22 conferences emphasizing nanotechnology in medicine, and has organized over 53 symposia at numerous conferences emphasizing biological interactions with nanomaterials. He also recently chaired the 2011 Annual Biomedical Engineering Society (BMES) Conference and has organized numerous symposia for AIChE, IEEE, MRS and ASME Annual Meetings. He has received numerous honors including, but not limited to: 2002, Biomedical Engineering Society Rita Schaffer Young Investigator Award; 2003, Outstanding Young Investigator Award Purdue University College of Engineering; 2005, American Association of Nanomedicine Young Investigator Award Finalist; 2005, Coulter Foundation Young Investigator Award; 2006, Fellow, American Association of Nanomedicine; 2010, Distinguished Lecturer in Nanomedicine, University of South Florida; 2011, Outstanding Leadership Award for the Biomedical Engineering Society (BMES); 2011, Fellow, American Institute for Medical and Biological Engineering (AIMBE, representing the top 2% of all medical and biological engineers); 2013, Fellow, Biomedical Engineering Society; 2014, Fellow, Ernst Strugmann Foundation; and 2014, President-elect, U.S. Society for Biomaterials.

PLENARY SPEAKERS

Polymeric Nanomedicines of Small Molecule Drugs and miRNA for Treating Pancreatic and Prostate Cancers



RAM I. MAHATO, PHD

PROFESSOR AND CHAIR,
DEPARTMENT OF PHARMACEUTICAL SCIENCES, UNIVERSITY OF NEBRASKA MEDICAL CENTER

Ram I. Mahato is a Professor and Chairman of the Department of Pharmaceutical Sciences, University of Nebraska Medical Center, Omaha, United States. He was a professor at the University of Tennessee Health Science Center, Research Assistant Professor at the University of Utah (with Sung Wan Kim), Senior Scientist at GeneMedicine, Inc., and as a postdoctoral fellow at the University of Southern California in Los Angeles, Washington University in St. Louis, and Kyoto University, Japan. He received PhD in Drug Delivery from the University of Strathclyde, UK and BS from China Pharmaceutical University, Nanjing. He has published 114 papers, holds 2 US patents, and has edited/written seven books and nine journal issues. He was a Feature Editor of the Pharmaceutical Research (2006-2013) and Editorial Board Member of eight journals. He is a CRS Fellow (2011), AAPS Fellow (2010), Permanent Member of BTSS/NIH Study section (2009-present), and ASGCT Scientific Advisor (nonviral vectors, 2006-2009). He teaches Pharmaceutical Principles to PharmD, and Drug Delivery to graduate students. In 2009, he was honored by the Excellence in Teaching Award from the University of Tennessee. He is applying sound principles in pharmaceutical sciences in the context of the latest advances in life and material sciences to solve challenging drug delivery problems in therapeutics. Particularly, his research has provided unique insight into the design of gene delivery and expression systems, factors influencing their biodistribution and gene expression or silencing, role of genetic modification of human islets for improved transplantation, and site specific delivery of oligonucleotides, siRNA and miRNAs for treating liver fibrosis, pancreatic and prostate cancers.

Adjuvants: A New Class of Drug Delivery Formulations



ALAN YOUNG, PHD

PROFESSOR,
DEPARTMENT OF VETERINARY AND BIOMEDICAL SCIENCES, SOUTH DAKOTA STATE UNIVERSITY

Dr. Young is a professor in the Department of Veterinary and Biomedical Sciences at South Dakota State University. He is also a chief scientific officer in the Medgene Labs, LLC. He received his PhD in Immunology from University of Toronto and BS in Immunology/Microbiology from University of Toronto. His research interests are in the areas of translational applications of immunological diagnostics, therapeutics, and research of large animal models and humans. His expertise is cellular immunology, domestic animal *in vivo* experimentation, flow cytometry, developmental immunology, and antibody production and analysis. At Medgene Labs, his primary focus is in the development of subunit vaccines and diagnostics for zoonotic and respiratory diseases of production animals, using a high-throughput screening approach to isolate, validate, and refine vaccine formulations.

INVITED SPEAKERS



RANJIT KOODALI, PhD

ASSOCIATE PROFESSOR

UNIVERSITY OF SOUTH DAKOTA

Antibacterial Activity of Zinc Oxide Nanoparticles



SANKU MALLIK, PhD

PROFESSOR

NORTH DAKOTA STATE UNIVERSITY

Multifunctional Polymersomes for Cytosolic Delivery of Gemcitabine and Doxorubicin to Cancer Cells



GREGORY G. BERTSCH

PRESIDENT & CEO

ANTIMICROBIAL MATERIALS INC.

Technology Transfer in Biomaterials: A Case Study

INVITED SPEAKERS



Medtronic

KYLE HAYS

Overview of Medical Device Production and
Engineering in the Medical Field



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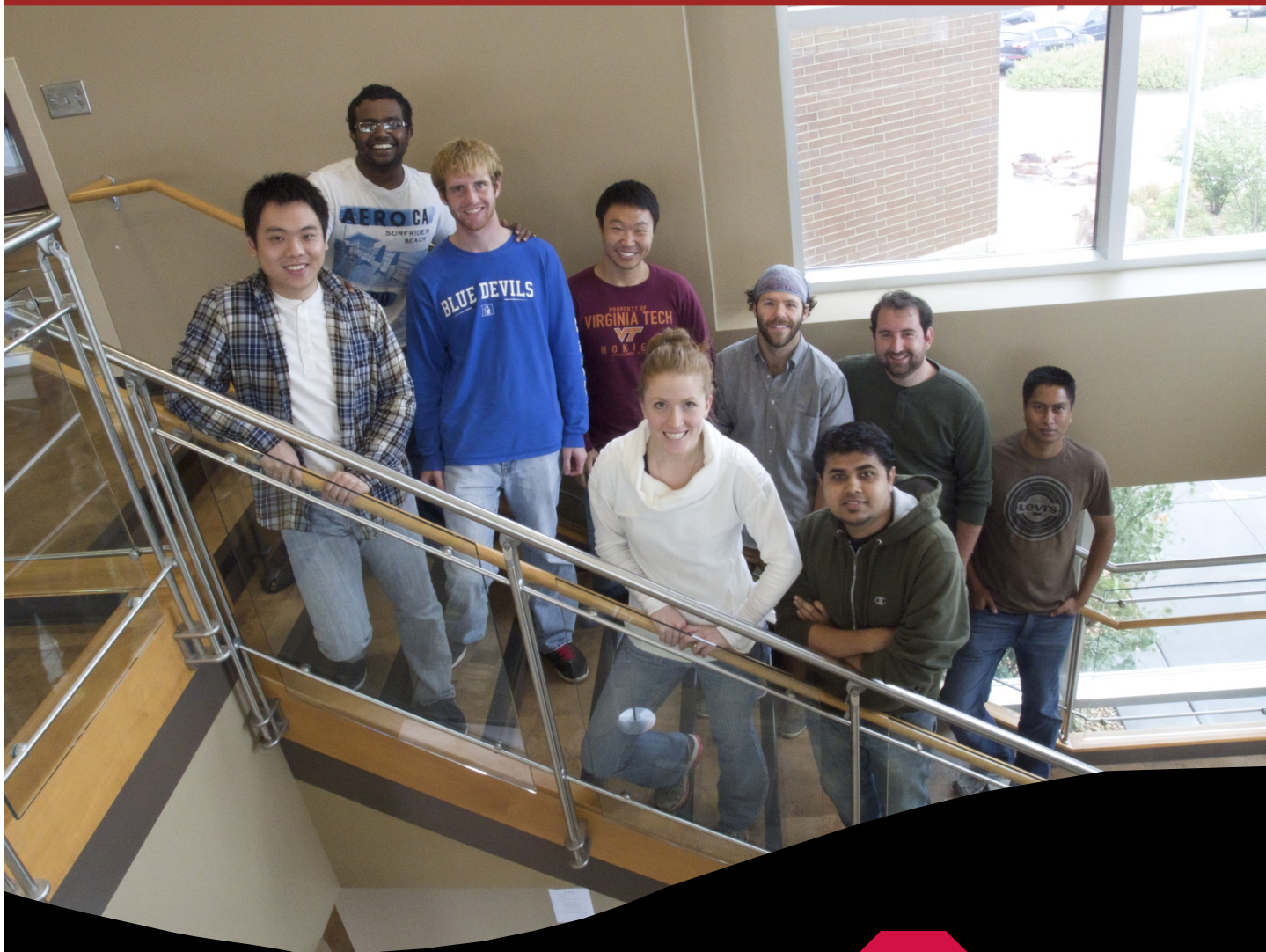
ANN C. SPAANS

The Stages of Drug Product Development

POSTER SESSION

1. Jordan Kuiper, Sujan Lamichhane, and Gopinath Mani; Release of Nitric Oxide from Heparin Coated Cobalt-Chromium (Co-Cr) Surfaces
2. Abby Malmanger, Lexie Mohror, Anna Tims, and Barrett Eichler; Optimization of a Green Synthesis of CdSe/ZnS Nanocrystals and their Bioconjugation to DNA
3. Yangxi Liu, Andre A. Williams, and Joshua A. Orlicki; Detection of Early Onset of Metal Corrosions
4. Eagappanath Thiruppathi, Mark K. Larson, and Gopinath Mani; Surface Modification of CoCr alloy Surfaces using Molecular Coatings for Improved Blood Compatibility
5. Jordan Anderson, Gopinath Mani; *In Vitro* and *In Vivo* Studies on the Solubility and Tissue Penetration of PAT Excipients Infused through a ClearWay Atrium RX Balloon Catheter
6. Berit Foss, Thomas Maxwell, and Ying Deng; Chondroitin Sulfate and Glucosamine Promote the Mechanical Properties of Alginate Hydrogel for Nucleus Pulposus Tissue Engineering
7. Annemarie Gallo, Gopinath Mani; Dual Drug-Eluting Coronary Stents
8. Sujan Lamichhane, Annemarie Gallo, and Gopinath Mani; Optimization of Paclitaxel Coating Process for a Polymer-Free Drug Eluting Stent
9. Bo Yang, Ying Deng; A Berberine-Loaded Electrospun PCL Nanofibrous Membrane as A New Wound Dressing Material
10. Eagappanath Thiruppathi, Gopinath Mani; Vitamin-C incorporated Poly-(lactic-co-glycolic acid) platform for Cardiovascular Stents
11. Sujan Lamichhane, Susan Lancaster, Eagappanath Thiruppathi, and Gopinath Mani; Vascular Cell Responses to Self-Assembled Monolayers based Drug Delivery Platform
12. Wei Lv, Jie Luo and Yuyu Sun; Chitosan Functionalized Polymer Surface with Rechargeable Antimicrobial Drug Loading Property
13. Susan Stoebner, Gopinath Mani; Drug Delivery from Microrough Cobalt-Chromium Alloy Surfaces
14. Sandeep Kakade, Gopinath Mani; Effect of Vitamin-C on the Viability, Proliferation, Morphology, and Phenotype of Endothelial Cells for Stent and Vascular Graft Applications
15. Eagappanath Thiruppathi, Sandeep Kakade, and Gopinath Mani; Delivery of Vitamin-C from Stent Material Surfaces Using a Polymer-Free Platform
16. Hongli Sun; Bio-inspired Bone Tissue Engineering & Regenerative Medicine
17. Berit Linnehan Foss, Thomas William Maxwell, and Ying Deng; Applying Biomimetics to Fabricate Tissue Engineered Nucleus Pulposus Scaffold

THANK YOU FOR ATTENDING
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