



The *BioInspired Design: Enabling Technologies in the Life and Materials Sciences Conference 2008*, held Aug 19-22 on the Mississippi State University campus attracted 171 registrants. Of all those registered, 142 attended at least one session. The composition of registrants was as follows, 56 faculty, 18 staff, 65 students, and 32 corporate representatives from 14 different technology companies. One hundred of the attendees were affiliated with MSU and the

remaining 41 attendees were from other universities and/or companies. Eight institutions were represented (Auburn University, Biomimicry Guild, Georgia Institute of Technology, McDaniel College, Memphis Zoo, Mississippi State University, Pennsylvania State University, Stanford University). Faculty/staff/students from MSU represented 6 colleges (College of Arts and Sciences, College of Agriculture and Life Science, College of Architecture, Art and Design, College of Business, College of Engineering, College of Veterinary Medicine) and 17 departments and/or research centers (Agricultural and Biological Engineering, Animal Dairy Science, Biology, BioChemistry and Molecular Biology, Center for Advanced Vehicular Systems, Center for Clean Energy Technology, Center for Veterinarian Medicine, Chemical Engineering, Chemistry, Communication, Electron Microscope Center, Entomology and Plant Pathology, GeoResources Institute, Landscape Architecture, Plant and Soil Science, Poultry Science).

Conference format, program details, more information on keynote speakers, platform and poster presentation abstracts, and platform presentations (PDF) can be found in the Conference Program and Platform Presentation documents online at www.bioinspired.msstate.edu. A summary of Conference program components, results, and post-conference comments are given in this brief *Summary of Results* document.

Program Components:

Keynote Speakers

Scientific Sessions (Platform Presentations)

- Patterns in Nature
- Functional/Structural Biomimetics
- Systems Biomimetics
- Biomimicry in Technology Development

Forum Discussion

- Strategies to foster interdisciplinary research across diverse fields of engineering and life sciences resulting in long-term success and sustainability

Workshops/Tutorials/Demos in state-of-the-art technologies in the life and materials sciences were provided by corporate sponsors

Opening Reception (Featuring Albert Einstein impersonator)

Corporate Reception and Poster Presentations

Five Keynote Speakers included recognized leaders in the Life and Materials Sciences. These speakers were chosen because each has a cross-disciplinary focus that transcends the “Bio-Inspired Design” concept.

Robert M. Nerem, *Professor and Director of the Parker H. Petit Institute for Bioengineering and Bioscience and the Georgia Tech/Emory Center for the Engineering of Living Tissues, Georgia Institute of Technology.*

Christopher Contag, *Director Stanford Near-Infrared Optics and FEL Center, Stanford University School of Medicine.*

Arun Gokhale, *Professor School of Materials Science and Engineering, Georgia Institute of Technology.*

Tim McGee, *Biologist at the Design Table and member of the Biomimicry Guild.*

Gregory R. Ziegler, *Director Center for Food Manufacturing, Penn State University*

All 5 Keynote Speakers presented an impressive body of research success and did a fabulous job sharing their diverse journeys from disciplinary to interdisciplinary research. They each successfully engaged the conference community, many of whom in turn found the keynotes truly inspirational. The Keynotes were equally impressed with the capabilities, expertise, drive, and promise that they found on the MSU campus. Several collaborations have been established between Keynotes and individual MSU faculty, and between MSU faculty from diverse disciplines. These collaborations would not exist in the absence of the recent *BioInspired Design 2008 Conference*.

Fifteen Corporate Sponsors participated in the conference through platform presentations and/or by offering demos/tutorials/workshops focused on sharing state-of-the-art materials and life science technologies. The technology and expertise on-site during the Conference was truly inspirational for all attendees. Several collaborations have been established between Corporate Sponsors (Principal Scientists/Application Specialists) and individual MSU faculty, and between MSU faculty from diverse disciplines. These collaborations would not exist in the absence of the recent *BioInspired Design 2008 Conference*.

A total of 22 platform presentations and 15 poster presentations were given over the 2 day period. Platform presentations included 12 by MSU faculty/staff/students and 10 by faculty from other institutions or application specialists from corporations.

The **Forum Discussion**, *Strategies to foster interdisciplinary research across diverse fields of engineering and life sciences resulting in long-term success and sustainability*, was led by Robert Nerem. Other keynote speakers contributed significantly to the discussion as did a number of MSU faculty and staff. Each Keynote, although from very different academic and disciplinary backgrounds has been successful at establishing and sustaining interdisciplinary efforts that transcend a BioInspired Design concept and focus. It is clear that there is no one strategy that works for all individuals, groups, and/or institutions. As clear is the fact that similar barriers to interdisciplinary efforts exist for many individuals and groups and at all institutions. Success comes with recognizing the barriers and having a supportive administration that is willing to assist in finding responsible ways to decrease those barriers.

Conference Sponsored Workshops

Zeiss EVO 50 – Variable Pressure Scanning Electron Microscope

Instructor: Mr. John Yorston
 Product Specialist
 Carl Zeiss SMT Inc.
 Nanotechnology Systems Division
 e-mail: yorston@smt.zeiss.com
 Cell: 646 725-3220

Attendees	Affiliation
Dr. Michael E. Miller	Professor Department of Biological Sciences Director Research Instrumentation Facility Auburn University, Auburn, Alabama
Dr. Valtcho Jeliakov	Assistant Research Professor North Mississippi Research/Extension Center, Verona Mississippi
Dr. Ron Palmer	Senior Research Assoc (L,P,S) Inst for Clean Energy Technology, Mississippi State University
Dr. Brenda Kirkland	Assistant Professor, Geosciences, Mississippi State University
Bill Monroe	Research Associate, MSU EMC
Richard Kuklinski	Research Associate, MSU EMC
Amanda Lawrence	Research Associate, MSU EMC
Matthew Rowe	MSU Graduate Student, Engineering
Keith Puckett	MSU Graduate Student, Geoscience
Young Park	MSU Graduate Student, Forest Products
Margaret Corley	MSU Graduate Student, Geosciences

Zeiss 510 CLSM – Live Cell Confocal Laser Scanning Microscopy and Maximizing Data Acquisition from Digital Images

Instructor: Scott Metzler
 Graduate Research Assistant
 Mississippi State University
 CoFounder Bulldogs for Heart Health
 sam144@msstate.edu
 bh2.org.msstate.edu

Attendees:	Affiliation
Bill Monroe	Research Associate, MSU EMC
Benjamin Weed	Graduate, Biomedical Engineering
Steven Waller	Graduate, Biomedical Engineering
Carol Pregonero Gamez	Graduate, Biomedical Engineering
Bo Wang	Graduate, Biomedical Engineering
Lauren Beatty	Graduate, Biomedical Engineering
Joe Chen	Graduate, Biomedical Engineering
Mark Begonia	Graduate, Biomedical Engineering
Chris Digesu	Senior, Biomedical Engineering
Joel Howard	Senior, Biomedical Engineering
Ali Borazjani	Junior, Biomedical Engineering

A Few Post Conference Comments

Comments from 3 Keynote Speakers

“Just a few comments in response to your request. These are as follows.

1. For interdisciplinary research it is essential that there be a vision for this that is shared by the faculty and the administration, including those at the top of the university. It is not clear that at MSU there is such a shared vision.
2. To foster interdisciplinary research, faculty from different disciplines need to be co-located, this is so that the interactions can be spontaneous in nature; this also will require an environment that provides for such spontaneity.
3. Such an environment may require a new building, one not carved up by the "silo-like" departments, but one designed to foster interactions.

Research is fundamentally a people business. I thus hope these comments help. Let me know if you need anything else. Best wishes” (Robert Nerem)

“Indeed, the BioInspired Design Conference culminated in bringing new ideas to the table. I think the interdisciplinary work on display was exciting, and the fertile ground between the sciences feels like it is just beginning to be explored at Mississippi State. The poster session involving the students was impressive, with posters from landscape architecture, medicine, engineering, and biology, I think the potential for future collaborations and investigations is boundless.

The conference keynotes were an exceptional group, all with backgrounds in multiple fields pointing to the rich and novel research possible when we open our eyes and look as children at our world. I think the conference was a big success, and I know myself and the rest of the Biomimicry Guild would be happy to return and persue further work and development of Bio-inspired design research at Mississippi State. Please don't hesitate to contact us at any time. Best Wishes,”

(Timothy McGee)

“Thanks once again for your hospitality.” (...talk about collaboration not included here) “About the conference. I am glad I came and spent the entire time there, I believe I picked up enough information to make the time worthwhile. I enjoyed speaking with the suppliers and hearing their talks, though I would have separated them out into an “applied” techniques session. I felt the conference name, “bio-inspired design” was somewhat of a misnomer. I didn't see much that I would place into that category, but then it is a nascent field and maybe not so well defined. Of course it was heavily weighed to MSU speakers, and so if your goal was to educated each other within the MSU community and coalesce some potential collaborations, then this was appropriate. I believe if you do this again, you will need to find a way to attract more outside speakers (without having to pay them).

(Gregory R. Ziegler)

Letter From One Attendee

Dear Giselle,

This letter is to thank you and the other organizers and sponsors for putting on the Bioinspired Design Conference at Mississippi State University. MSU needs far more technical conferences with a series of top notch speakers from top universities so that both our faculty and our students are exposed to the true state of art in various fields. This conference allowed our students and faculty to hear some first class intellects and to give some of their own work in the same forum. Bravo for this effort. People at Penn State, Georgia Tech and Stanford need to know where Starkville is, what is going on here and, most importantly, what can occur here in the near future. I enjoyed the many cross disciplinary talks and the questions raised.

I wonder about one key point. Did Robert Nerem and Christopher Contag have a chance to speak with Dr. Schulz, Dr. Rabideau and/or the assembled college deans and center directors? These two individuals in particular articulated what their institutions had done to promote interdisciplinary research at Georgia Tech and Stanford. I am particularly familiar with GA. Tech since a friend, Charles Liotta, was VP for Research for several years and I had him visit and give a seminar in chemistry and then took him to dinner with Colin Scanes to review how Tech turned around their sciences and engineering. Many of these key issues were forcefully laid out by Dr. Nerem and I summarize a few points below.

1. Offer internal seed grant programs which must have two PIs from different departments.
2. Offices in several centers and institutes are mixed so that no two people from the same home department are next to each other.
3. Shared core facilities. Lab spaces most often have different faculty and their students sharing space (which forces crosstalk).
4. Philosophy and plan to make it happen (both bottom-up and top-down).
5. Reward structure for P&T to foster complex interdisciplinary research.
6. Committees for PhD students and degree plan set up so individual department requirements can't supercede the committee-determined course of study.
7. Use of temporary incubator space to integrate faculty efforts across different disciplines.
8. Handling P&T with university committees made up of those who know the work best (even if they are not in the dept. of those being evaluated). A highly technical evaluation is then sent to the home dept.
9. Access to all instrumentation guaranteed to all faculty and faculty are not charged for access and use (this is a university commitment).
10. Much much more.

I hope that this message found its way throughout administration at MSU. These messages came from those at the top of their fields at top 10 locations. We need a steady dose of these types of messages and exposures at MSU.

Now the question becomes, what will MSU do with these lessons?
Chuck Pittman

Conference Organizers

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Conference Staff (*Graduate and Undergraduate Students*)

Erin Trueblood
Greg Eakins
Maggie Corley
Greg May
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Marion Harris
Michael Barnard
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Sara Tanner