News Update:
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Research Highlights

CBE faculty member Co-PI on recent NSF $3 million award to MSU

The National Science Foundation recently awarded $3 million to MSU for the creation of a new nanotechnology center. **Phil Stewart**, CBE-affiliated faculty member in chemical and biological engineering, is a Co-PI on the grant, which is part of an $81 million, national effort to boost American research and development in a fast-growing and promising field that requires very specialized equipment and expertise. Nanoscience and nanotechnology—the study and application of extremely small things—are pushing the envelope in the full array of science and engineering fields.

Read more about the award and the anticipated nanotechnology center at *MSU News*: "NSF awards $3 million to MSU to expand nanotechnology"

Publication Spotlight

Feature article: *Nature Publication Journals Biofilms and Microbiomes*

Congratulations to MSU-CBE graduate and first author **James Connolly**, students, and faculty on their recent feature article "Estimation of a biofilm-specific reaction rate: Kinetics of bacterial urea hydrolysis in a biofilm," in *Nature Publication Journals Biofilms and Microbiomes*. Urea-hydrolysing biofilms are of interest to the medical community when treating urinary tract infections and scientists and engineers when studying microbially-induced carbonate precipitation. In order to appropriately model these systems, biofilm-specific reaction rates need to be measured. In this article, researchers at Montana State University and Temple University developed a simple method for determining biofilm-specific reaction rates using biofilms of *E. coli* bacteria.

npj Biofilms and Microbiomes is an open access, online multi- and interdisciplinary journal dedicated to publishing the finest research on microbial biofilms and microbiomes. The journal hosts cross-disciplinary discussions and allows for our understanding of mechanisms governing the social behavior of microbial biofilm populations and communities, and their impact on life, human health, and the environment, both natural and engineered. *npj Biofilms and Microbiomes* is part of the Nature Publishing Group which publishes *Nature*, a leading weekly, international scientific journal founded in 1869.

Connolly JM, **Jackson B**, **Rothman AP**, **Klapper I**, **Gerlach R** "Estimation of a biofilm-specific reaction rate: Kinetics of bacterial urea hydrolysis in a biofilm," *npj Biofilms and Microbiomes* 2015; 1, 15014.

First author: James Connolly, PhD graduate, March 2015, chemical & biological engineering, MSU, CBE
Co-authors:
Ben Jackson, PhD graduate, August 2015, mathematics, MSU, CBE
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Robin Gerlach, professor, chemical & biological engineering, MSU, CBE

Link to article: http://www.nature.com/articles/npjbiofilms201514

Cover image: *Proceedings of National Academy of Sciences*, August 2015

Researchers at the University of Montana earned the cover image of the August 2015 issue of *Proceedings of The National Academy of Sciences* (*PNAS*) with images collected at the CBE microscopy facility. Assistant professor John McCutcheon and PhD student James Van Leuven from the University of Montana's Division of Biological Sciences worked with **Betsey Pitts**, CBE microscope facilities manager, to obtain the cover images using the confocal scanning laser microscope at MSU's Center for Biofilm Engineering. McCutcheon has also collaborated with CBE affiliated faculty member **Phil Stewart**, professor of chemical and biological engineering.

"This collaboration reiterates the CBE's commitment to interdisciplinary research, not only across MSU's campus. The CBE supports an exceptional state-of-the-art microscope facility and we are happy to share our resources with collaborators from other Montana universities to advance research," Pitts said.

Proceedings of National Academy of Sciences
August 2015; 112(33): 10101–10103.

To view the cover image, visit our Research Cover Gallery:
http://www.biofilm.montana.edu/multimedia/galleries/research-covers.html

Latest Publications

Ammons MCB, Morrissey K, Tripet BP, Van Leuven JT, Han A, Lazarus GS, Zenilman JM, **Stewart PS**, **James GA**, Copie V
"Biochemical association of metabolic profile and microbiome in chronic pressure ulcer wounds"
PLoS ONE, 2015; 10(5):e0126735.
Read abstract

Lohman EJ, **Gardner RD**, **Pedersen T**, **Peyton BM**, Cooksey KE, **Gerlach R**
"Optimized inorganic carbon regime for enhanced growth and lipid accumulation in *Chlorella vulgaris*"
Biotechnol Biofuels, 2015 Jun 11; 8:82.
Read abstract

McOliver CA, **Camper AK**, Doyle JT, **Eggers MJ**, Ford TE, Lila MA, Berner J, Campbell L, Donatuto J
"Community-based research as a mechanism to reduce environmental health disparities in American Indian and Alaska native communities"
Int J Environ Res Public Health, 2015; 12(4):4076–4100.
Read abstract

Ritter D, Vinson D, **Barnhart E**, Akob DM, **Fields MW**, **Cunningham AB**, Orem W, McIntosh JC
"Enhanced microbial coalbed methane generation: A review of research, commercial activity, and remaining challenges"
Intl J Coal Geology, July 2015; 146:28–41.
Read abstract

Stewart PS, **Franklin MJ**, **Williamson KS**, **Folsom JP**, **Boegli L**, **James GA**
"Contribution of stress responses to antibiotic tolerance in *Pseudomonas aeruginosa* biofilms"
Antimicrob Agents Chemother, July 2015; 59(7):3838–47.
Read abstract

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Employee News

CBE faculty member **Darla Goeres**, associate research professor in chemical and biological engineering, was recently appointed to NASA's Advisory Council Planetary Protection Subcommittee (PPS). The planetary protection subcommittee is responsible for programs, policies, plans, hazard identification and risk assessment, and other matters pertinent to the Agency's responsibilities for biological planetary protection. PPS supports the advisory needs of the NASA administrator and all mission directorates and protection officers.

Read more about the PPS at http://science.nasa.gov/science-committee/subcommittees/nac-planetary-protection-subcommittee/

New Staff

Marnie Feder is a new postdoctoral researcher in the lab of CBE faculty member **Robin Gerlach**, professor of chemical and biological engineering. Marnie will be working with Dr. Gerlach and Dr. Adie Phillips (assistant professor, civil engineering) on developing advanced

mineral precipitation technologies for sealing applications and stabilization of coal combustion residues. Marnie received her PhD in civil engineering from the University of Glasgow, Scotland, where her research focused on determining biogeochemical mechanisms responsible for heavy metal immobilization in sustainable drainage systems. Marnie is originally from Chicago but has lived in Denver for many years. She enjoys traveling and getting up in the mountains to snowboard or to take her dog swimming. Welcome to the CBE Marnie!

Outreach

Visiting Students

The CBE recently welcomed **Suvi Manner**, a visiting PhD student from the Pharmaceutical Sciences Laboratory at Åbo Akademi University in Turku, Finland. While at the CBE, Suvi will be conducting efficacy studies using the drip flow reactor in the Standardized Biofilm Methods Laboratory (SBML) under the direction of **Darla Goeres**, SBML manager and associate research professor in chemical and biological engineering. Her work at the CBE is important to the overall goal of her doctoral thesis project, which is to identify and characterize potent biofilm inhibitors mainly from natural and naturally-derived compound libraries utilizing diverse biomolecular screening approaches. Her research strategy is to combine phenotypic and target-based screening, inhibition and efficacy studies using a combination of experimental research and computational methods. Suvi earned her master's degree in biosciences with a specialization in pharmacy. She will be working at the Center until December 4, 2015.

Industrial Visitors

CBE hosted two representatives from American Chemet on October 13, 2015. **Colin Anderson**, R&D director, and **Neal Blossom**, director of global environmental and regulatory affairs, met with **Paul Sturman**, CBE industrial coordinator, and members of CBE's standardized biofilm methods laboratory to discuss several testing projects.

People in Action

The following CBE researchers presented research at The International Workshop or Organic Matter Spectroscopy (WOMS), Sopot, Poland, September 22–25, 2015:

Heidi Smith, PhD student, land resources & environmental sciences, as a speaker presented "Transformations in autochthonous DOM: An Antarctic supraglacial case study."

Juliana D'Andrilli, assistant research professor, chemical & biological engineering, presented the poster "Bulk and molecular level characterization of organic matter in glacial ice."

Garth James, associate research professor, chemical & biological engineering, as an invited speaker presented "Biofims and chronic wounds," at the following meetings:

Why Wounds Won't Heal Conference, Bozeman Deaconess Wound Clinic, Bozeman, MT, September 25, 2015.

Why Won't this Wound Heal? workshop at the Fall 2015 Symposium on Advanced Wound Care (SAWC), Las Vegas, NV, September 28, 2015. The workshop was made possible by an educational grant from Convatec.

Phil Stewart, professor, chemical & biological engineering, as an invited speaker presented "Antimicrobial tolerance in biofilms: Physics, chemistry, biology," Department of Biological Sciences, University of Calgary, Canada, September 28, 2015.

The following CBE graduate students presented research at the Algal Biomass Summit in Washington D.C., September 29–October 2, 2015:

Tisza Bell, PhD student, microbiology & immunology, as a track panel speaker presented "Can ecology provide insight for algal lipid accumulation strategies in open systems?" Track: Systems Ecology; Algae Technology: Tools for understanding and optimizing crop assessment.

Matthew Jackson, PhD student, chemical & biological engineering, presented the poster "Promoting lipid accumulation in *Chlorella vulgaris* UTEX395 using nitrogen limitation and bicarbonate amendment." Jackson won first place in the Young Researcher Poster Competition (biology track); as well as a student travel grant from The Algae Foundation to attend the conference.

Todd Pederson, master's student, chemical & biological engineering, presented the poster "An enhanced culturing strategy for *Nannochloropsis gaditana* stimulating high lipid accumulation through the use of nitrogen depletion and bicarbonate amendment." Pederson won third place in the Young Researcher Poster Competition (biology track).