

CBE NEWSLETTER Volume 28, Issue 1 • June 2025

INDUSTRY

Montana Biofilm Science & Technology Meeting

CBE looks forward to hosting its industry members and invited guests at the upcoming Montana Biofilm Science and Technology Meeting happening July 9–11 in beautiful Bozeman, Montana. The agenda promises an engaging and informative event with a blend of fundamental and applied presentations on the advances of biofilm research happening at the CBE and other labs, with prescribed time for connection between industry and academia.

The theme of this year's meeting "Rules of Biofilm Behavior," will be integrated throughout the session topics. If you are interested in membership and would like to attend the meeting, contact [Darla Goeres](#), CBE Coordinator of Industrial Development. [View draft agenda](#)



Announcing this year's Young Investigator Awardees:

Andrew Bridges, assistant professor in biological sciences at Carnegie Mellon University, will present "Biofilm dispersal patterns revealed using far-red fluorogenic probes."

Shawna Pratt, postdoctoral researcher in microbiology and immunology at Geisel School of Medicine at Dartmouth College, will present "Testing the implications of micron-scale texture on microbial surface sensing and biofilm formation: An indwelling-device model."

CBE launched the Young Investigator program in 2009 to encourage the participation of outstanding non-Montana State University biofilm investigators at our annual Montana Biofilm Meeting. Targeting postdoctoral researchers and newly hired faculty, investigators are invited to present their research at MBM, attend the meeting for free, and receive \$1,000 toward travel. The call for abstracts for this award is posted each April.

CBE has been at the global forefront of biofilm research for 35 years

Montana State University's Center for Biofilm Engineering (CBE), the world's first and largest research center dedicated to biofilms, is turning 35 this year. Its global reputation for groundbreaking discoveries has led to hundreds of innovative partnerships with



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cornerstone to the CBE's continued leadership and success," said Matthew Fields, director of the CBE.

New Member Update

CBE welcomes five companies to its innovative Industrial Associates Program.



Advanced Sterilization Products (ASP) is a medical equipment manufacturer located in Irvine, California. The company develops the products, solutions, and processes needed by healthcare practitioners to protect patients during their medical procedures. Among its many achievements, ASP pioneered the idea of using hydrogen peroxide for device sterilization. ASP was a previous member from 2019-2020.



Diversey, a Solenis Company, is a specialty chemical supplier and water treatment company for a range of markets. Collaborative R&D is carried out through specialized customer application laboratories. Two-thirds of the company's technology investment targets new chemical treatment platforms and monitoring and control equipment. Tiffany Williams is the CBE company rep. Diversey was a previous member under the company Sealed Air Corporation from 2012-2016.



Hydrite Chemical, one of the largest independent providers of chemicals and related services in the country, has joined CBE's Industrial Associates program as a full member. Specialties include chemical manufacturing, food ingredients, dairy sanitation, organic processing, sulfur chemistries, and water treatment systems. R&D interests include foam control technologies, customized product trials, and membrane technologies. Diana Bergmann is the CBE designated rep.



IWC Innovations specializes in water safety solutions, focusing on Legionella risk mitigation, water treatment, and pathogen testing. Their services include Legionella detection, prevention, remediation, and compliance support for various industries, such as



Vantive, formerly Baxter Kidney Care, a leading healthcare company of 70 years, has joined CBE's Industrial Associates program as a full member. Services and solutions include dialysis treatment, vital organ product and therapy education, and telecare for patients in more than 100 countries. R&D interests include digitally enhanced solutions and therapy efficiency. Baxter was a member of the CBE Industrial Associates program for 16 years. CBE looks forward to Vantive continuing Baxter's legacy of engagement with CBE faculty, the Medical Biofilms Lab, and the Standardized Biofilm Methods Lab. Mark Pasmore is the CBE's designated representative.

View the list of [CBE Industrial Members](#)

Read about the [CBE Membership Program](#)

RESEARCH HIGHLIGHTS



Montana State researcher examines how rangelands respond to heat and drought stress

MSU Department of Ecology researcher Hannah Goemann is at the forefront of research that studies how Montana's grassland communities survive heat stress and drought. Using blue grama as a model species, Goemann hopes to discover how specific microbes contribute to drought tolerance, which can then be translated to sustainable agricultural production. Read more about Hannah's work [here](#).



Montana State researchers secure \$2.5 million to combat microscopic threats to military vehicles

The U.S. Department of Defense recently awarded a \$2.5 million, three-year contract to the CBE to study the destructive biofilms that grow on the surfaces of military vehicles in humid climates. CBE's Brent Peyton, a professor in MSU's Department of Chemical and Biological Engineering, is the principal investigator on the project. "Department of Defense tactical vehicles utilize special paints to prevent rust and corrosion, as well as some coatings that are resistant to chemical agents like nerve

RESEARCH PUBLICATIONS

"Assessing the effects of surgical irrigation solutions on human neutrophil interactions with nascent *Staphylococcus aureus* biofilms"

Gaur, G., Predtechenskaya, M., Voyich, J. M., **James, G., Stewart, P. S., & Borgogna, T. R.**

Microorganisms 2024, 12(10), 1951.

[Read abstract](#)

"Association of biofilm and microbial metrics with healing rate in older adults with chronic venous leg ulcers"

Stewart, P. S., Kim, J., **James, G.,** Yi, F., Stechmiller, J., Weaver, M., Kelly, D. L., **Fisher, S.,** Schultz, G., & Lyon, D.

Wound Rep Reg 2024, 32(6), 858-871.

[Read abstract](#)

"Drastic hourly changes in hand hygiene workload and performance rates: A multicenter time series analysis"

Moore, L. D., Arbogast, J. W., Robbins, G., DiGiorgio, M., & **Parker, A. E.**

Am J Infect Control 2024, 52(12), 1371-1376.

[Read abstract](#)

"Effect of surface roughness on the microbiologically influenced corrosion (MIC) of copper 101"

Acharjee, A., Keskin, Y., Peyton, B. M., Fields, M. W., & Amendola, R.

Front Mats 2024, 11.

[Read abstract](#)

"Eight genome sequences of bacterial, environmental isolates from Canada Glacier, Antarctica"

Smith, H. J., Dieser, M., & Foreman, C. M.

Microbiol Res Announce 2024, 13(8), e01130-01123.

[Read abstract](#)

"Genome-guided isolation of the hyperthermophilic aerobe *Fervidibacter sacchari* reveals conserved polysaccharide metabolism in the Armatimonadota"

Nou, N. O., Covington, J. K., Lai, D., Mayali, X., Seymour, C. O., Johnston, J., Jiao, J.-Y., Buessecker, S., Mosier, D., Muok, A. R., Torosian, N., Cook, A. M., Briegel, A., Woyke, T., Eloë-Fadrosch, E., Shapiro, N., Bryan, S. G., Sleezer, S., Dimapilis, J., **Carlson, R. P.,** Hedlund, B. P.

Nat Comms 2024, 15(1), 9534.

[Read abstract](#)

"Global challenges and microbial biofilms: Identification of priority questions in biofilm research, innovation and policy"

Coenye, T., Ahonen, M., **Anderson, S.,** Cámara, M., Chundi, P., **Fields, M.,** Foidl, I., Gnimpieba, E. Z., **Griffin, K.,** Hinks, J., Loka, A. R., Lushbough, C., MacPhee, C., Nater, N., Raval, R., Slater-Jefferies, J., Teo, P., Wilks, S., Yung, M., & Webb, J. S.

Biofilm 2024, 8, 100210.

[Read abstract](#)

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metabolically differentiated cells”

Schaible, G. A., Jay, Z. J., Cliff, J., Schulz, F., Gauvin, C., Goudeau, D., Malmstrom, R. R., Ruff, S. E., Edgcomb, V., & **Hatzenpichler, R.***PLOS Biol* 2024, 22(7), e3002638.[Read abstract](#)

“Profiling luminal pH in three-dimensional gastrointestinal organoids using microelectrodes”

Lyon, K., Bansil, R., & **Bimczok, D.***JoVE* 2024, 209, 1940-087X.[Read abstract](#)

“Relaxation-weighted MRI analysis of biofilm EPS: Differentiating biopolymers, cells, and water”

Willett, M. R., Codd, S. L., Seymour, J. D., & Kirkland, C. M.*Biofilm* 2024, 8, 100235.[Read abstract](#)

“Rheo-NMR velocimetry of nanocrystalline cellulose suspensions”

Stanley, M. A., Jayaratne, J. S., **Codd, S. L.,** Bajwa, D. S., **Wilking, J. N., & Seymour, J. D.***Appl Rheol* 2024, 34(1).[Read abstract](#)

“Scientists’ call to action: Microbes, planetary health, and the Sustainable Development Goals”

Crowther, T. W., Rappuoli, R., Corinaldesi, C., Danovaro, R., Donohue, T. J., Huisman, J., Stein, L. Y., Timmis, J. K., Timmis, K., Anderson, M. Z., Bakken, L. R., Baylis, M., Behrenfeld, M. J., Boyd, P. W., Brettell, I., Cavicchioli, R., Delavaux, C. S., **Foreman, C. M.,** Jansson, J. K., van Galen, L. G.*Cell* 2024, 187(19), 5195-5216.[Read abstract](#)

“Splitting tensile strength of shale cores: intact versus fractured and sealed with ureolysis-induced calcium carbonate precipitation (UICP)”

Bedeý, K., Willett, M. R., Crandall, D., Rutqvist, J., Matteson, K., **Phillips, A. J., Cunningham, A. B., & Kirkland, C. M.***Geomech Geophys Geo-Energy Geo-Resourc* 2024, 10(1), 181.[Read abstract](#)View [CBE Publications Database](#)

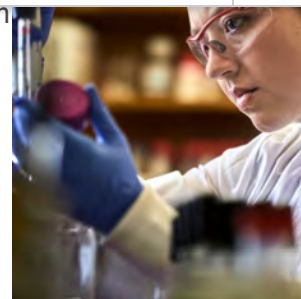
EDUCATION

CBE undergraduate student wins prestigious NSF Graduate Research Fellowship

Montana State University student Amanda Haab has earned the prestigious Graduate Research Fellowship from the National Science Foundation. Amanda graduated from MSU’s Honors College with a bachelor’s degree in microbiology and a bachelor’s degree in cell biology and neuroscience. The five-year fellowship provides three years of financial support. “It is exciting to be named an NSF graduate research fellow,” said Haab.

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exemplifies the talented students we have at the Center for Biofilm Engineering,” said Matthew Fields, director of the CBE.



Thesis Alert

“A parallelized, ultrahigh-throughput droplet microfluidic platform for single-cell antimicrobial susceptibility testing and heteroresistance detection,” successful thesis defense by **Carter Hoffman**, PhD candidate, chemical & biological engineering, Montana State University, April 25, 2025.

[Read abstract](#)

“Design and evaluation of an additive-manufactured microfluidic device for observing initial biofilm attachment on copper surfaces,” successful thesis defense by **Handenur Arpali**, MS candidate, chemical & biological engineering, Montana State University, April 23, 2025.

[Read abstract](#)

“Design optimization and validating of a simulated microgravity biofilm reactor for simulating spacecraft wastewater systems,” successful thesis defense by **Matthew Culp**, master's candidate, mechanical & industrial engineering, Montana State University, April 21, 2025.

[Read abstract](#)

“Material coatings and strategies for biofilm mitigation in spacecraft water systems,” successful thesis defense by **Madelyn Mettler**, PhD candidate, chemical & biological engineering, Montana State University, April 16, 2025.

[Read abstract](#)

“Alternative binders to improve hempcrete material properties and microbial viability,” successful thesis defense by **Leah Davidson**, master's candidate, mechanical & industrial engineering, Montana State University, April 14, 2025.

[Read abstract](#)

“RheoNMR as a technique to study shear-induced transitions in nanocolloidal suspensions,” successful thesis defense by **Maribelle Stanley**, PhD candidate, chemical & biological engineering, Montana State University, April 9, 2025.

[Read abstract](#)

“Analysis of nitrogen processes and dynamics in a sub-alpine climate constructed wetland,” successful thesis defense by **Stephanie Ayotte**, PhD candidate, civil engineering, Montana State University, April 7, 2025.

[Read abstract](#)

“Characterization of microfabricated resistance temperature detectors for electrochemical measurements,” successful thesis defense by **Haley Ketteler**, master's candidate, electrical & computer engineering, Montana State University, April 4, 2025.

[Read abstract](#)

“Viscoelastic characterization of chondrocytes with a 3D-printed variable-height fluidic device,” successful thesis defense by **Michael Neubauer**, PhD candidate, mechanical & industrial engineering, Montana State University, November 22, 2024.

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November 18, 2024.

[Read abstract](#)

"Applications of 3D printing in biofilm engineering and high-throughput diagnostics development," successful thesis defense by **Isaak Thornton**, PhD candidate, mechanical & industrial engineering, Montana State University, November 15, 2024.

[Read abstract](#)

NEW STAFF

Mike Neubauer



Post-doc Mike Neubauer is working with CBE associate professor Stephan Warnat, who specializes in micro-electro-mechanical systems, to develop aptamer functionalized electrochemical impedance spectroscopy sensors for biofilm monitoring in Montana river systems. Aptamers are synthetic DNA or RNA molecules that bind to specific target molecules such as biofilms, which can identify trends. "I especially enjoy the interdisciplinary nature of this work as it combines mechanical and electrical engineering with microbiology," said Neubauer.

Originally from Rogers, Minnesota, Neubauer earned his PhD in mechanical and industrial engineering from Montana State University in December 2024. In his free time he enjoys hunting, fishing and fly tying.

Patrick Thomas



Not too many people have studied albatross vomit, which puts Patrick Thomas in a highly elite group. That was part of his biology studies at the University of California. Years later, with a PhD in environmental sciences and biodiversity from the University of Oldenburg in Germany, Thomas has teamed up with Robin Gerlach, professor chemical and biological engineering at CBE, to study microalgae.

"These tiny but super-productive and efficient plants could possibly revolutionize agriculture," said Thomas. "I am searching for insights into how to make them as

Brittan Scales



Brittan Scales is a microbiologist with expertise in immunology, bioinformatics, and microbial community-environment interactions. She is currently working with CBE director Matthew Fields on the Ecosystems and Networks Integrated with Genes and Molecular Assemblies (ENIGMA) project, a multidisciplinary, multi-institutional research consortium, as well as other microbial community-related projects at the CBE. "I especially enjoy the ability to investigate microbial community dynamics and adaptations in unique environments with complex contaminant gradients," she said.

A native of the Mason area in central Michigan, Scales enjoys hiking, backpacking, cycling and reading with soon-to-be husband and fellow CBE researcher Patrick Thomas.

Grady Wertman



Grady Wertman works in the lab of Laura Jennings, assistant professor of microbiology and cell biology and faculty affiliate at CBE. As lab manager and research associate, he is investigating how gene expression in *P. aeruginosa* is regulated by epigenetic mechanisms, which will help to understand its behavior and adaptability.

"I am excited that this research will contribute to fresh, foundational knowledge of bacterial epigenetics and how this information could potentially translate to better therapeutic outcomes in treatment of bacterial infections," said Wertman.

A native of Billings, Montana, Wertman earned bachelor's degrees in cell biology and microbiology from MSU in Bozeman. He enjoys camping and yardwork.

Hannah Choi



Hannah Choi is a post-doc researcher working with associate professor of microbiology and cell biology Frank Stewart at the CBE, where she is studying methane and nitrogen

"I especially enjoy looking at deeply familiar systems and methods with fresh eyes and from a new angle and thinking about cool microbial metabolisms," she said. A native of Atlanta, Georgia, Choi earned her PhD in marine science from the University of Georgia. In her spare time she enjoys social dances and fiber arts.

OUTREACH



Darla Goeres, CBE affiliate faculty, was awarded a four-year COST Action titled "Building Consensus on Biofilm Regulatory Decision Making" CA23152. The COST Action will focus on bringing together teams of researchers across the EU and UK who are leading in their field – pushing the boundaries and developing the most innovative biofilm methods – to update the equipment, models, and methods used by regulatory, industrial, and clinical stakeholders for improved decision making. COST (European Cooperation in Science and Technology) is a funding organization for research and innovation networks.



Founders Day Awards

Forty of Montana State University's students and their faculty and staff mentors were recognized in February 2025 at the 43rd annual Founder's Day Awards for Student Excellence in the Strand Union Ballrooms. Honored students are nominated by faculty in their colleges or departments. Qualified nominees must have at least a 3.0 GPA and demonstrated campus leadership and community service. Students each select a mentor who will be recognized with them at the event, which is hosted by the MSU Alumni Foundation.

Grace Roemig, a CBE undergrad in mechanical engineering from Excelsior, Minnesota was honored. In turn, Grace nominated her mentor Chelsea Heveran, assistant professor in mechanical and industrial engineering and CBE affiliate faculty.

Additionally, in recognition of Founders Day, Montana State University honored its dedicated advisers, teachers and researchers with annual awards, recognizing achievements in faculty research, teaching, outreach and creative projects. Two CBE affiliated faculty members received award:

Ross Carlson, professor of chemical and biological engineering at the Norm Asbjornson College of Engineering, received the Cox Faculty Award for Creative Scholarship and Teaching. Nominees for this award must show superior research skills and upper division/graduate instruction. Currently, Carlson collaborates on several projects, with support from the National Science Foundation (NSF), NASA, and the Department of Energy. Students from his laboratory have gone on to win prestigious awards, including NSF Graduate Research Fellowships.

Brent Peyton, a professor of chemical and biological engineering at the Norm Asbjornson

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education and shows a history of successful guidance of graduate students, from their arrival at MSU through the launch of their professional careers. Peyton's research interests include biofilms, biofuels, and thermophile bioprocessing. He is also the owner of five U.S. patents.

All of the winners can found here:

<https://www.montana.edu/provost/faculty/awards/founders-day>

Fellowships



CBE graduate student Matthew Willett has received a research fellowship from the Department of Energy's Office of Science under the Science Graduate Student Research Fellowship program. He will spend six months at the DOE National Energy Technology Laboratory in West Virginia, working with an industry collaborator on the CBE's mercury intrusion capillary pressure (MICP) shale fractures project.



Cheyenne Darrow, a doctoral student in microbiology, started her internship at Pacific Northwest National Laboratory in February 2025. She will conduct experiments on glacial ice, water and sediment samples she collected last summer in Alaska. Detection techniques include Fourier transform ion cyclotron resonance mass spectrometry, nanoscale secondary ion mass spectrometry, and pyrolysis-gas chromatography-mass spectrometry. Cheyenne works in Christine Foreman's lab.

VISTING RESEARCHERS

Felix Weinhardt



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recently arrived in Bozeman from Germany to start a collaborative six-month research project with the CBE.

The title of the project is "Quantifying and controlling the motility of ureolytic bacteria for engineering applications of biomineralization." Weinhardt will be working with professors Stephan Warnat, Joe Seymour, and Robin Gerlach on the motility and attachment of *S. pasteurii* in porous media, specifically microfluidic cells. Weinhardt enjoys sports and outdoor activities and is looking forward to experiencing everything Montana has to offer —"and here in Bozeman, that hopefully includes a lot of fly fishing," he added.

Roos Goedhart



Roos Goedhart is a PhD candidate at Delft University of Technology in the Netherlands. Her doctorate is centered on drinking water treatment with a focus on how microbes oxidize arsenic in groundwater sand filters. "This is a key process in producing arsenic-free drinking water," she said.

Goedhart will perform the final experimental work for her PhD with the sophisticated equipment at the CBE. "I study the microbe-mineral interactions on the sand grains from the groundwater filters and investigate which bacteria are active in arsenic-rich waters," she said. "I enjoy using the microscopes in the Bioimaging Core and the Imaging and Chemical Analysis Laboratory and have learned a lot already!"

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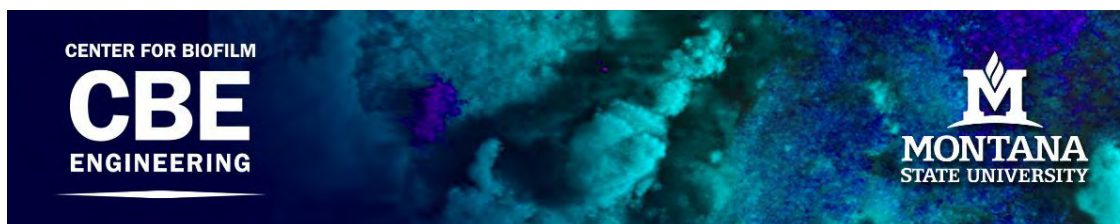


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INDUSTRY

Save the Date! Regulatory Pathways meeting scheduled for Jan. 29 & 30 in Washington, DC

CBE's annual regulatory pathways meeting for members and invited guests will be held **Jan. 29 & 30, 2025** at the Crystal Gateway Marriott Hotel in Arlington, Virginia. CBE is sponsoring this meeting for the twelfth consecutive year to bring together industry, regulatory agencies, and academia to discuss anti-biofilm technologies and the regulatory pathways to bring a life-saving product to market. The 1.5-day meeting will feature presentations that address current and future priorities from the FDA and EPA, the latest R&D and anticipated needs from industry, and emerging technologies happening in academia—all in the context of these critical topics: **healthcare-acquired infections, surface disinfection, and standard methods.** If you are interested in membership and would like an invitation to this meeting, please contact [Darla Goeres](#).



[Learn more information about the CBE's biofilm meetings.](#)

New Member Update

CBE welcomes the return of three companies to its innovative Industrial Associates Program.



Albemarle is a leading global specialty chemicals company, headquartered in Charlotte, North Carolina. They manufacture bromine-based products used in fire safety, oilfield drilling, and other industrial systems. Albemarle is also one of the world's largest producers of lithium, crucial for electric vehicle batteries and energy storage systems. They were members from 1998-2000 and we're thrilled to be working with them again. Todd Aplin is the CBE's designated rep at the company.

BAUSCH + LOMB

Bausch & Lomb is a world-renowned healthcare company dedicated to helping people see better, feel better, and live better. With over 170 years of experience, the company is known for its comprehensive range of products and services that address various aspects of eye health. We will be working with their surgical products division. B&L first joined the IA Program in 2006 and maintained their membership for seven years. We look forward to working with them again.



BD is one of the largest medical technology companies in the world. The CBE will be working with the BD Medical segment, which specializes in the design and manufacturing of medical devices, instrument systems, and reagents. They focus on providing solutions that enhance patient safety, improve outcomes, and advance the efficiency of healthcare systems. BD's product portfolio includes items for injection, infusion, and surgical procedures, among others. James Freasier is the CBE's designated rep at BD.

View the list of [CBE Industrial Members](#)
Read about the [CBE Membership Program](#)

RESEARCH HIGHLIGHTS

Montana State researcher studies nano-scale materials that mimic enzymes to convert CO2 into chemical building blocks

James Crawford, a newly affiliated faculty member of the CBE and an assistant professor in MSU's Department of Chemical and Biological Engineering, talks about his work on nano-scale materials that mimic natural enzymes, focusing on innovative processes to convert carbon dioxide into valuable chemicals, supporting sustainable solutions in energy and chemical production. [Read more](#)

Montana State scientists publish evidence for new groups of methane-producing organisms

A team of MSU scientists including CBE affiliated faculty member **Roland Hatzenpichler**, associate professor in MSU's Department of Chemistry and Biochemistry, have identified new groups of methane-producing microorganisms, advancing our understanding of methane's biological origins and its potential environmental impacts. [Read more](#)

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"Aging alters the subchondral bone response 7 days after noninvasive traumatic joint injury in C57BL/6JN mice"

Dauenhauer, Lexia A., Brady D. Hislop, Priyanka Brahmachary, **Connor Devine**, Dustin Gibbs, Ronald K. June, **Chelsea M. Heveran**
J Orthoped Res, June 2024, 1-11.

[Read abstract](#)

"Aging decreases osteocyte peri-lacunar-canalicular system turnover in female C57BL/6JN mice"

Vahidi, Ghazal, Connor Boone, **Fawn Hoffman**, **Chelsea Heveran**
Bone, September 2024, 186:117163.

[Read abstract](#)

"Beyond the surface: Non-invasive low-field NMR analysis of microbially-induced calcium carbonate precipitation in shale fractures"

Willett, Matthew R., **Kayla Bedey**, Dustin Crandall, **Joseph D. Seymour**, Jonny Rutqvist, **Alfred B. Cunningham**, **Adrienne J. Phillips**, **Catherine M. Kirkland**
Rock Mech Rock Eng, July 2024, s00603-024-04052-9.

[Read abstract](#)

"Biodegradability of unheated and laboratory heated dissolved organic matter"

Promi, Saraf Islam, Courtney M. Gardner, **Amanda K. Hohner**
Environ Sci: Processes & Impacts, 2024, 26:1429-1439.

[Read abstract](#)

"Coupon position does not affect *Pseudomonas aeruginosa* and *Staphylococcus aureus* biofilm densities in the CDC biofilm reactor"

Buckner, Elizabeth, **Kelli Buckingham-Meyer**, **Lindsey A. Miller**, **Albert E. Parker**, **Christopher J. Jones**, **Darla M. Goeres**
J Microbiol Meth, August 2024, 223:106960.

[Read abstract](#)

"Cultivation and visualization of a methanogen of the phylum Thermoproteota"

Kohtz, Anthony J., Nikolai Petrosian, **Viola Krukenberg**, **Zackary J. Jay**, Martin Pilhofer, **Roland Hatzenpichler**
Nature, July 2024, 632:1118-1123.

[Read abstract](#)

"Digital droplet RT-LAMP increases speed of SARS-CoV-2 viral RNA detection"

Yuan, Yuan, Perry Ellis, Ye Tao, **Dimitri A. Bikos**, **Emma K. Loveday**, **Mallory M. Thomas**, **James N. Wilking**, **Connie B. Chang**, Fangfu Ye, David A. Weitz
Smart Medicine, June 2024, 3(2):e20240008.

[Read abstract](#)

"Diversity and evolution of nitric oxide reduction in bacteria and archaea"

Murali, Ranjani, Laura A. Pace, Robert A. Sanford, L. M. Ward, **Mackenzie M. Lynes**, **Roland Hatzenpichler**, Usha F. Lingappa, Woodward W. Fischer, Robert B. Gennis, James Hemp
PNAS, June 2024, 121(26): e2316422121.

[Read abstract](#)

"Human gastric organoid-derived mucus shares key properties with native gastric mucus"

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Brown, **James Wilking**, Rama Bansil, **Diane Bimczok**

Physiology, 2024, 39(1).

[Read abstract](#)

"Methyl-reducing methanogenesis by a thermophilic culture of Korarchaeia"

Krunkenberg, Viola, **Anthony J. Kohtz**, Zackary J. Jay, **Roland Hatzenpichler**

Nature, July 2024, 632:1131-1136.

[Read abstract](#)

"MicrobioRaman: An open-access web repository for microbiological Raman spectroscopy data"

Lee, Kang Soo, Zachary Landry, Awais Athar, Uria Alcolombri, Pratchaya Pramoj Na Ayutthaya, David Berry, Philippe de Bettignies, Ji-Xin Cheng, Gabor Csucs, Li Cui, Volker Deckert, Thomas Dieing, Jennifer Dionne, Ondrej Duskocil, Glen D'Souza, Cristina García-Timmermans, Notburga Gierlinger, Keisuke Goda, **Roland Hatzenpichler**, Richard J. Henshaw, Wei E. Huang, Ievgeniia Iermak, Natalia P. Ivleva, Janina Kneipp, Patrick Kubryk, Kirsten Küsel, Tae Kwon Lee, Sung Sik Lee, Bo Ma, Clara Martínez-Pérez, Pavel Matousek, Rainer U. Meckenstock, Wei Min, Peter Mojzeš, Oliver Müller, Naresh Kumar, Per Halkjær Nielsen, Ioan Notingher, Márton Palatinszky, Fátima C. Pereira, Giuseppe Pezzotti, Zdenek Pilat, Filip Plesinger, Jürgen Popp, Alexander J. Probst, Alessandra Riva, Amr. A. E. Saleh, Ota Samek, Haley M. Sapers, Olga T. Schubert, Astrid K. M. Stubbusch, Loza F. Tadesse, Gordon T. Taylor, Michael Wagner, Jing Wang, Huabing Yin, Yang Yue, Renato Zenobi, Jacopo Zini, Ugis Sarkans, Roman Stocker

Nature Microbiology, May 2024, 9:1152-1156.

[Read abstract](#)

"Microbial community dynamics in a two-stage treatment wetland: Insights from treating seasonal ski resort wastewater"

Ayotte, Stephanie H., Sarah J. Wallace, **Christopher R. Allen**, Kela P. Weber, **Otto R. Stein**, **Ellen G. Lauchnor**

Bioresource Technology Reports, September 2024, 27:101885.

[Read abstract](#)

"Selenate bioreduction in a large in situ field trial"

Hendry, M. Jim, Lisa Kirk, Jeff Warner, Shannon Shaw, **Brent M. Peyton**, Erin Schmeling, S. Lee Barbour

Science of the Total Environment, July 2024, 933:172869.

[Read abstract](#)

"Unlocking the societal potential of engineered living materials"

Heveran, Chelsea M., **Robin Gerlach**, Christopher J. Hernandez, Kristen Intemann, Anne S. Meyer, Caroline Ajo-Franklin, Marimikel Charrier, Wilfred V. Srubar, Neel Joshi, Alshakim Nelson, **Matthew W. Fields**

Matter, September 2024, 7(9): 2846-2858.

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PEOPLE

New Affiliate Faculty

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Laura Jennings is an assistant professor in microbiology and cell biology. Her research interest is biofilm polysaccharides and bacterial epigenetics in order to understand infection outcomes and improve treatments, with a focus on vaccine escape and drug resistance mechanisms. Her goal is to leverage insights from these areas to develop innovative approaches to combat bacterial infections. An MSU and CBE alumna, Laura earned her bachelor's degree in chemical and biological engineering. From MSU, she went on to Cornell University, where she earned her PhD in civil and environmental engineering.



Patrick Secor is an associate professor of microbiology and cell biology, specializing in bacteriophages and their interactions with bacteria and the immune system, with the aim to develop phage-based therapies for antibiotic-resistant infections and inflammatory diseases. Pat earned his PhD in Chemistry and Biochemistry from Montana State and worked at the CBE throughout his PhD program. Dr. Garth James, manager of the CBE Medical Biofilms Laboratory, served as one of Pat's PhD advisors.

Employee News



Ghazal Vahidi has joined the CBE as a postdoctoral researcher. Ghazal earned her PhD in mechanical and industrial engineering from MSU and is now part of the team working on a recently awarded grant from the DoD's Strategic Environmental Research and Development Program (SERDP). The team is researching biological impacts on military vehicle coatings and establishing lab methods to study biofilm-induced defects. Ghazal is passionate about her work, as it combines materials science with microbiology, an exciting interdisciplinary challenge. She is mentored by Drs. Brent Peyton and Heidi Smith. When not in the lab, you can find Ghazal enjoying outdoor activities and pondering scientific curiosities.

Visiting Student Researcher

[Subscribe](#)[Past Issues](#)[Translate ▼](#)**Ana Barbosa, University of Porto**

With a BSc in biotechnology and an MSc in molecular genetics, Ana is currently pursuing a PhD in chemical and biological engineering. Her research explores mRNA PNA-FISH methods to study *Legionella pneumophila* biofilms, with the goal of advancing biofilm engineering and public health solutions. Ana started at the CBE in July 2024 and will be working at the center for one year.

OUTREACH



Global challenges and microbial biofilms: Setting future research, innovation, and policy agendas

CBE researchers and staff were part of a comprehensive study outlining a roadmap for advancing the field of biofilm research by identifying key research priorities. The product of this interdisciplinary working group is this research paper, 'Global Challenges and Microbial Biofilms: Identification of Priority Questions in Biofilm Research, Innovation, and Policy,' which marks a significant step towards addressing the global challenges posed by microbial biofilms. [Read more](#)

Small Steps, Giant Leaps: Episode 135: Biofilm - Dealing with the Scum off the Earth

In this podcast, NASA scientist and CBE collaborator **Yo-Ann Velez Justiniano**, explains biofilm behavior in space and microbial growth on spacecraft. NASA and CBE are working together on methods to prevent contamination in missions. [Read more](#)



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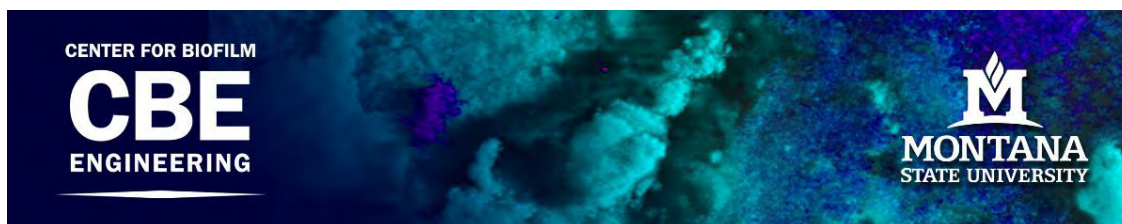
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CBE NEWSLETTER Volume 27, Issue 2 • June 2024

INDUSTRY

Montana Biofilm Science & Technology Meeting

CBE looks forward to hosting its industry members and invited guests at the upcoming Montana Biofilm Science and Technology Meeting happening July 10–12 in beautiful Bozeman, Montana. The agenda promises an engaging and informative event with a blend of fundamental and applied presentations on the advances of biofilm research

happening at the CBE and other labs, and prescribed time for connection between industry and academia. The theme of this year's meeting "biofilm as a system," will be integrated throughout the session topics. [View draft agenda.](#)



Announcing this year's Young Investigator Awardees:

Jontana Allkja, postdoctoral research assistant at the University of Glasgow Dental School and Hospital, will present "Crafting polymicrobial wound biofilm models through microbiome analysis."

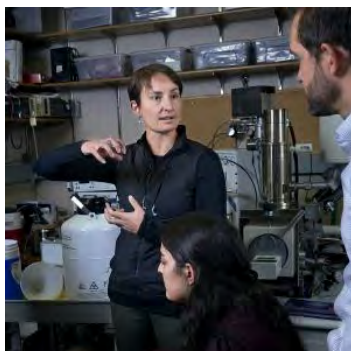
Sakcham Bairoliya, research fellow in civil and environmental engineering at Nanyang Technological University in Singapore, will present "Monochloramine induces release of DNA and RNA from bacterial cells: Quantification, sequencing analyses, and implications."

CBE launched the Young Investigator program in 2009 to encourage the participation of outstanding non-Montana State University biofilm investigators at our annual Montana Biofilm Meeting. Targeting postdoctoral researchers and newly hired faculty, investigators are invited to present their research at MBM, attend the meeting for free, and receive \$1,000 toward travel. The call for abstracts for this award is posted each April.

[Read more about the meeting including costs and how to register.](#)

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Montana State engineering professor Chelsea Heveran wins prestigious NSF CAREER award to study osteocyte interactions with bone matrix



Chelsea Heveran, an affiliate faculty at the CBE, works extensively on biomineralized engineered living materials, some of which are inspired by bone. [Read more](#)

CBE graduate student earns top NASA fellowship

A graduate student at Montana State University has been awarded a distinguished fellowship from NASA. **Haley Ketteler**, who is expected to graduate with a master's degree in electrical engineering later this year, will use the Space Technology Graduate Research Fellowship to pursue her doctorate in mechanical engineering at MSU. [Read more](#)



RESEARCH PUBLICATIONS

"Bio-cementation via microbially induced calcium carbonate precipitation for surface applications: The effects of sand particle size on uniformity and strength"
Olds, Sabine, Hudson Dorian, Adrienne Phillips, Mohammed Khosravi, **Catherine Kirkland, Alfred Cunningham, Lauren Arbaugh, Randy Hiebert**
Geo-Congress 2024:186-195.

[Read abstract](#)

"Biofilm and human spaceflight"
Goeres, Darla M., Yo-Ann Velez-Justiniano, Birthe Veno Kjellerup, Robert JC. McLean
Biofilm, 6:100150.

[Read abstract](#)

"Biofilm reactors for the treatment of used water in space: potential, challenges, and future perspectives"
Espinosa-Ortiz, Erika J., Robin Gerlach, Brent M. Peyton, Luke Roberson
Biofilm, 2023, 6:100140. 23-032.

[Read abstract](#)

"Biotrapping ureolytic bacteria on sand to improve the efficiency of biocementation"
Ugur, Gizem U., Kylee Rux, John Connor Boone, **Rachel Seaman**, Recep Avci, **Robin Gerlach, Adrienne Phillips, Chelsea Heveran**
ACS Applied Materials & Interfaces, 16(2):2075-2085.

[Read abstract](#)

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powder"

Saraçoğlu, Mert, Mubashir Mansoor, Utku Bakırdöven, **Handenur Arpalı**, Utku Orçun Gezici, Servet Timur*J Alloys Compounds*, 968:171895.[Read abstract](#)

"Clothing textiles as carriers of biological ice nucleation active particles"

Teska, Christy J., Markus Dieser, Christine M. Foreman*Environ Sci Technol*, 2024, 58(14):6305-6312.[Read abstract](#)

"Critical analysis of methods to determine growth, control and analysis of biofilms for potential non-submerged antibiofilm surfaces and coatings"

Fern, J., A.J.Cunliffe, **Darla M. Goeres**, Nuno F. Azevedo, J. Verran*Biofilm*, 2024, 7:10087.[Read abstract](#)

"Metabolomic profiles of cartilage and bone reflect tissue type, radiography-confirmed osteoarthritis, and spatial location within the joint"

Hope D. Welhaven, Ethan Viles, Jenna Starke, Cameron Wallace, Brian Bothner, Ronald K. June, Alyssa K. Hahn*Biochem Biophys Res Comm*, 703: 149683.[Read abstract](#)

"Naegleria fowleri detected in Grand Teton National Park Hot Springs"

Barnhart, Elliott P., Stacy M. Kinsey, Peter R. Wright, Sara L. Caldwell, Vince Hill, Amy Kahler, Mia Mattioli, Robert S. Cornman, Deborah Iwanowicz, Zachary Eddy, Sandra Halonen, **Rebecca Mueller, Brent M. Peyton**, Geoffrey J. Puzon*ACS EST Water*, 2024, 4(2):628-637.[Read abstract](#)"Prokaryotic microbial ecology as an ecosurveillance tool for eukaryotic pathogen colonisation: *Meiothermus* and *Naegleria fowleri*"Malinowski, Natalia, Matthew J. Morgan, Jason Wylie, Tom Walsh, Sergio Domingos, Suzanne Metcalfe, Anna H. Kaksonen, **Elliott P. Barnhart, Rebecca Mueller, Brent M. Peyton**, Geoffrey J. Puzon*Water Research*, 254:121426.[Read abstract](#)

"Rapamycin does not alter bone microarchitecture or material properties quality in young-adult and aged female C57BL/6 mice"

Devine, Connor C., Kenna C. Brown, Kat O. Paton, **Chelsea M. Heveran**, Stephen A Martin*JBMR Plus*, 8(2): ziae001.[Read abstract](#)

"Sample sizes for estimating the sensitivity of a monitoring system that generates repeated binary outcomes with autocorrelation"

Parker, Albert E., J.W. Arbogast*Stat Methods Med Res*, 2023, 32(12):2347-2364.[Read abstract](#)"Severe and mild drought cause distinct phylogenetically linked shifts in the blue grama (*Bouteloua gracilis*) rhizobiome"**Goemann, Hannah M., Danielle E.M. Ulrich, Brent M. Peyton**, La Verne Gallegos-Graves, **Rebecca C. Mueller**

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"Simulated aging of draught beer line tubing increases biofilm contamination"

Miller, Lindsey A., Kelli Buckingham-Meyer, Darla M. Goeres

Intl J Food Microbiol, 2024, 415:110630.

[Read abstract](#)

"Single-cell herpes simplex virus type 1 infection of neurons using drop-based microfluidics reveals heterogeneous replication kinetics"

Fredrikson, Jacob P., Luke F. Domanico, **Shawna L. Pratt, Emma K. Loveday,**

Matthew P. Taylor, **Connie B. Chang**

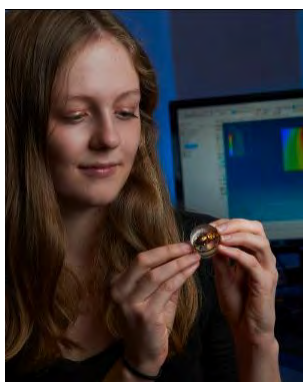
Sciences Advances, 2024, 10(9):eadk9185.

[Read abstract](#)

[View CBE Publications Database](#)

EDUCATION

Milestone: Two female CBE students earn doctorate degrees in mechanical and industrial engineering



It is the first time at MSU that two women at once have graduated with doctorates in mechanical and industrial engineering, a field in which women are historically underrepresented.

Cailin Casey (top, left) and Ghazal Vahidi each graduated from MSU's Norm Asbjornson College of Engineering during Spring Commencement on Friday, May 10. [Read More](#)

Thesis Alerts

"Synthesis and biological evaluation of novel antimicrobial agents for the control and eradication of pathogenic biofilms," successful thesis defense by **Heidi Koenig**, PhD candidate, chemistry & biochemistry, Montana State University, April 5, 2024.

[Read abstract](#)

"Assessing a novel approach to pharmaceutical removal from wastewater: Aerobic granular sludge," successful thesis defense by **Kylie Bodle**, PhD candidate, civil engineering, Montana State University, April 17, 2024.

[Read abstract](#)

"Multi-length scale mechanical investigation of the flying insect thorax," successful thesis defense by **Cailin Casey**, PhD candidate, mechanical and industrial engineering, Montana State University, April 19, 2024.

[Read abstract](#)

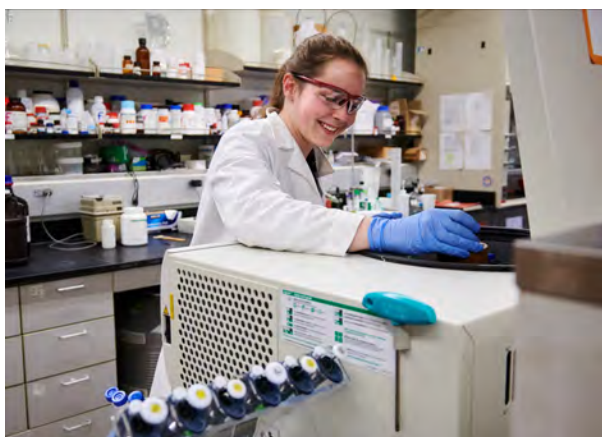
"Determining the impact of osteocyte lacunar-canalicular turnover on bone matrix quality,"

OUTREACH

TBI-CBE Extreme Biofilms REU Program renewed



The MSU Extreme Biofilms Research Experience for Undergraduates (EB-REU) was recently renewed for another three years. This hands-on research program that explores the limits of life is a 10-week summer program designed to engage participants in a research project aimed at discovering new ways to grow, understand, and utilize extremophilic biofilms for human benefit.



Undergraduate scientists gain a direct appreciation for the unique physical, physiological, and genetic adaptations of biofilm-forming microorganisms found in numerous extreme systems. [Read more on the program](#)

In the Media



Congratulations to **Isaac Miller**, CBE PhD graduate in microbiology and cell biology, for his cover image on the June 2024 issue of *Trends in Biotechnology*. Interactions between algae and the phycosome may impact the productivity of industrial cultures. This fluorescence microscopy image of an aggregate of *Chlorella* sp. SLA-04 and its phycosome underlines the ecological complexity of xenic algal cultures. Miller and colleagues highlight the current understanding of the phycosome and some future directions for taking advantage of phycosome ecology in production systems.

“Understanding phycosomal dynamics to improve industrial microalgae cultivation”

Isaac R. Miller, Huyen Bui, Jessica B. Wood, Matthew W. Fields, Robin Gerlach
Trends in Biotechnology, June 2024, 42 (6): 680-698.

DOI: <https://doi.org/10.1016/j.tibtech.2023.12.003>

Norm Asbjornson College of Engineering awards

The Norm Asbjornson College of Engineering recognized the achievements of its faculty and staff at a luncheon on May 6, 2024. Two CBE affiliate faculty were honored at the event.



Roberta Amendola, associate professor in mechanical and industrial engineering, received the 2024 Norm Asbjornson College of Engineering Excellence in Advising award.



Heidi Smith, assistant research professor in microbiology and cell biology and manager of the CBE Bioimaging CORE, took home the 2024 Outstanding Research Faculty award.

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