UMassAmherst | Polymer Science and Engineering

ALUMNI NEWSLETTER

Fall | 2020

In This Issue

PSE Newsletter Team
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- David Hoagland (Lead Writer)
- Jessica Skrocki (PSE Media Coord.)
- Moira Clingman (Design & Layout)

Special thanks to
- Laura Bradley
- Todd Emrick
- Reika Katsumata
- James Watkins
- Janet Lathrop

Update contact info at https://www.pse.umass.edu/alumni-form.

Please send comments to jskrocki@polysci.umass.edu

Remarks from our Chair

Dear PSE Alumni and Friends of the Department,

The Polymer Science and Engineering Department (PSE) stands at the forefront of its field, and each year, PSE's contributions both scientifically and technologically reach new heights. I feel honored to work in such an amazing place. Since joining the department in 1985, I've heard many times about the "maturing" of the polymer field, but each time, just a little later, I learned of a discovery that turned the field on its head. Today, even as "polymers" are finally familiar to the public, the fundamental scientific issues and basic technological questions of polymeric materials challenge us as never before. PSE — and its alumni — are central to global efforts to address key issues and questions. We as a group are thriving because of our excellence and because our efforts are central to society's march to an age in which polymers will be ubiquitous.

Since the last PSE Newsletter, PSE added two new junior faculty members, Laura Bradley and Reika Katsumata, and soon more faculty members will be added. Importantly, in a few months the search for PSE's third endowed professorship, the Robert K. Barrett Chair, will commence. Bradley and Katsumata are building interdisciplinary research programs incorporating polymer chemistry, polymer physics, and polymer engineering; these programs are briefly described elsewhere in this newsletter, and I'm pleased to note that both already received significant external research support. Shaw Ling Hsu, PSE's most senior active faculty member, recently retired, although he remains highly active. Also, since the last newsletter, PSE added key capabilities, including advanced roll-to-roll manufacturing equipment, and soon, a new high-resolution scanning electron microscope with features unknown anywhere just a few years ago. PSE awarded more Ph.D.s last year than ever before, and this year, PSE achieved for the first time a student body that is 50% female. At least some understanding of polymers is nowadays needed by everyone, and to work in this direction, PSE students are running amazing outreach programs that reach numerous schools, museums, and other off-campus venues.

As true from PSE's beginnings, financial support of first-year graduate students is an overriding priority. This first year of intense but unfettered polymer education is crucial to thesis success and beyond. However, obtaining the funds needed to maintain this important tradition is becoming increasingly difficult. As always we ask our alumni, who themselves benefited from this ambitious year of polymer education, to think of PSE in their philanthropic giving. We are proud and grateful to point out that the growth of PSE alumni support has grown tremendously in the past few years, to the point where an unprecedented number of first-year students are now supported by alumni fellowships (see page 3). We hope that over time that corporate and alumni gifts, along with endowment income, will grow to a level where it can provide full support of the PSE first-year class, thereby ensuring opportunities for future generations of PSE graduate students that are equal, or even better, than those experienced by past generations.

David Hoagland

PSE Alumni and Industrial Fellowship Awardees

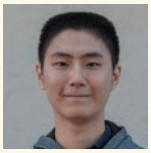
Xuhong Chen
PPG Foundation Fellowship
2019-2020
BS Chemistry, Shenzhen University

Roshni Chethalen
PPG Foundation Fellowship
2019-2020
BS & MS Chemical Sciences, Indian Institute of Science Kolkata

Christopher Cueto
David Lipp Fellowship in Polymer Science and Engineering
2019-2020
BS Chemistry, Juniata College

Hazel Davis
Kleiner Family Fellowship
2017-2018
BS Chemistry, Furman University

Zachary Fink
PSE Fellow
2017-2018
BS Chemical Engineering, Lehigh University



Hongbo Fu
PSE 50 Alumni Fellowship
2017-2018
BS Macromolecular Materials, Fudan University Shanghai

Heather Hamilton
PSE 50 Alumni Fellowship
2017-2018
BS Chemistry, University of West Florida

Brian Jun
PSE 50 Alumni Fellowship
2019-2020
BS Materials Science and Engineering, and Chemical and Biomolecular Engineering, University of Pennsylvania

Emily Maling
Ananda & Ajanta Chatterjee Fellowship
2017-2018
BA Chemistry, Johns Hopkins University

Alex McGlasson
William J. MacKnight Fellowship
2019-2020
BS Chemical Engineering, University of Cincinnati

Cornelia Meissner
Professor Richard J. Farris Scholarship
2019-2020
BS Chemistry, Johannes Gutenberg-Universität Mainz

Eva Morgenthaler
Kleiner Family Fellowship
2019-2020
BS Biomedical Chemistry, Johannes Gutenberg-Universität Mainz

Sravya Nuguri
Arkema Fellowship
2018-2019
BS Polymer Engineering, Inst of Chemical Technology

James Pagaduan
PPG Foundation Fellowship
2018-2019
BS Chemistry, Ateneo de Manila University

Evon Petek
David Lipp Fellowship in Polymer Science and Engineering
2018-2019
BA Chemistry, College of Wooster

Anne Radzanowski
PSE 50 Alumni Fellowship
2019-2020
BS Chemistry, Chatham College

Xiaoshuang (June) Wei
Arkema Fellowship
2017-2018
BS, Polymer Materials, Zhejiang University

Hsin-Jung (Hanna) Yu
Kleiner Family Fellowship
2017-2018
BS Materials Science, Penn State University, University Park

Le Zhao
Lenz Scholarship Fund
2017-2018
BS Polymer Science, Zhejiang University

Hantao Zhou
PPG Foundation Fellowship
2018-2019
BS Materials Chemistry, Peking

Faculty & Student Awards

Faculty

Laura Bradley
Air Force Office of Scientific Research YIP Award, 2020
National Science Foundation CAREER Award, 2019
ACS Petroleum Research Fund Doctoral New Investigator Grant, 2018
3M Non-Tenured Faculty Award, 2018

Kenneth Carter
Lawrence Livermore National Laboratory Director's Award for Science and Technology, 2018

E. Bryan Coughlin
American Chemical Society Fellow, 2018

Al Crosby
Adhesion Society Excellence in Adhesion Award, 2019

Ryan Hayward
National Science Foundation Special Creativity Extension, 2019
Fellow of the American Physical Society, 2018
Blavatnik National Awards Finalist in Physical Sciences & Engineering, 2018

Reika Katsumata
American Chemical Society, Petroleum Research Fund, Doctoral New Investigator Grant, 2019

Thomas Russell
National Academy of Inventors, 2018
Shull Prize, Neutron Scattering Society of America, 2020

Maria Santore
Chancellors Medal, University of Massachusetts, 2018
Distinguished Faculty Lecturer, University of Massachusetts, 2017-2018

Students

Dylan Barber
National Defense Science and Engineering Graduate Fellowship, 2017

Christopher Barney
Peebles Award from the Adhesion Society, 2020

Daniel Camarda
Best Teaching Award, 2018, 2019

Allen Chang
Soft Matter for Life Sciences-NRT Fellowship 2019-2020

Xuhong Chen
PPG Foundation Fellowship, 2019-2020

Roshni Chethalen
PPG Foundation Fellowship, 2019-2020

Brandon Clarke
NIH Biotechnology Training Program (BTP) Fellowship, 2020-2021

Christopher Cueto
David Lipp Fellowship in Polymer Science and Engineering, 2019-2020

Hazel Davis
Kleiner Family Fellowship, 2017-2018
Soft Matter for Life Sciences-NRT Fellowship 2019-2020

Joshua Enokida
DoD National Defense Science and Engineering Graduate (NDSEG) Fellowship, 2018

Robert Enright
NSF Graduate Research Fellowship, 2019-2021

Zachary Fink
Santos Go Award PSE, 2018-2019
PSE Fellow, 2017-2018
DOE SCGSR Program Award, 2019-2020

Hongbo Fu
PSE 50 Alumni Fellowship, 2017-2018
PPG Foundation Fellowship, 2018-2019

Heather Hamilton
PSE 50 Alumni Fellowship, 2017-2018
NSF Graduate Research Fellowship Honorable Mention, 2019

Brian Jun
PSE50 Alumni Fellowship, 2019-2020

Alexa Kuenstler
Journal of Polymer Science Poster Prize 3rd place
APS March Meeting, 2018
(Finalist) Frank J. Padden Jr. Award – APS March Meeting, 2020

Emily Maling
Ananda & Ajanta Chatterjee Fellowship, 2017-2018

Khatcher Margossian
Soft Matter for Life Sciences-NRT Fellowship, 2018-2019

Alex McGlasson
William J. MacKnight Fellowship, 2019-2020

Demi Moed
NSF Graduate Research Fellowship, 2019-2021

Eva Morgenthaler
Kleiner Family Fellowship, 2019-2020

Cornelia Meissner
Professor Richard J. Farris Scholarship, 2019-2020

Sravya Nuguri
Arkema Fellowship, 2018-2019

James Pagaduan
PPG Foundation Fellowship, 2018-2019

Evon Petek
David Lipp Fellowship in Polymer Science and Engineering, 2018-2019

Anne Radzanowski
PSE50 Alumni Fellowship, 2019-2020

Chinmay Saraf
Santos Go Award PSE, 2017-2018
SPE Foundation Thermoplastic Materials & Foams Division Scholarship, 2020-2021

Deborah Snyder
NIH Biotechnology Training Program (BTP) Fellowship, 2019-2021

Takumi Uchiyama
Conte Polymer Fellowship, 2019-2020

Huyen Vu
Graduate Program for STEM Diversity (GFSD), 2017-2019

Xiaoshuang (June) Wei
Arkema Fellowship, 2017-2018

Walter Young
GAANN Fellowship, 2019

Hsin-Jung (Hanna) Yu
Kleiner Family Fellowship, 2017-2018

Le Zhao
Lenz Scholarship Fund, 2017-2018 PPG Foundation Fellowship, 2017-2018

Hantao Zhou
Santos Go Award PSE, 2019-2020
PPG Foundation Fellowship, 2018-2019

Retirements

After 40 years as a faculty member in PSE, Professor **Shaw Ling Hsu** accepted emeritus status starting June 2019; with the new status, he continues to conduct laboratory research and maintain a small research group. Shaw came to UMass with physics degrees from Rutgers U (B.A., 1970) and U Michigan (Ph.D., 1975). After finishing his doctorate in Professor Krimm's lab at U Michigan, he briefly worked at Allied Chemical before moving to PSE as an assistant professor in 1978. He then rapidly moved up through the ranks, becoming a full PSE professor in 1987. Subsequently, he served extended and important stints as MRSEC Director and then PSE Department Head.

Throughout his career, Shaw has placed much attention on the international standing of PSE, often promoting the department through his numerous interactions across Asia. Shaw's research centers on the vibrational spectroscopic characterization of polymer morphology, with efforts variously directed at liquid crystalline polymers, piezoelectric and ferroelectric polymers, polymer phase separation, polymer-metal interfaces, conformational analysis of biopolymers, and polyurethanes. In recent years, much of his attention has been directed toward polymers from environmentally appropriate sources, particularly the crystallization properties of poly(lactic acid), a biodegradable polymer derived from corn.

Shaw's research continues to find much industrial interest, and a number of recent projects led to patents with industry partners. With his new status, Shaw will have more time to spend with his wife Sophie as well as his children and grandchildren.

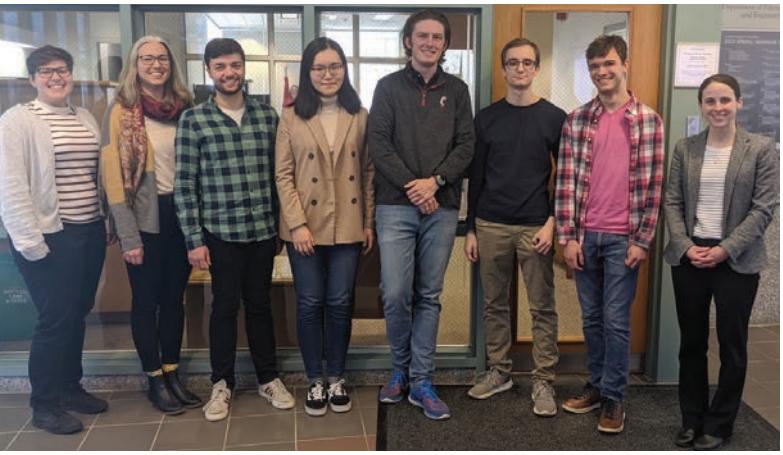
Jack Hirsch and **John Nicolson**, long-term staff members in Conte, recently retired, although both will stay on to work part-time for the University on post-retirement appointments. For their post-retirement work, Hirsch will supervise several large infrastructure projects in Conte, and Nicolson will continue his cleanroom duties until new cleanroom staff come onboard.

Hirsch, who started in PSE in 1980, spent most of his 40-year career as Director of the Surface Analysis Laboratory, where he managed XPS and other instrument resources. In recent years, he further acted as the Conte Building Manager, handling building maintenance, emergencies, and renovations. Generations of PSE 602 students will remember his teaching of the course's surface analysis lab exercise, and then, his invaluable assistance during their subsequent Ph.D. research in constructing the complex plumbing, gas, and electrical connections needed for home-made research instruments.

Nicolson, hired in 2001, oversaw the construction and then the operations of the Conte cleanroom. He too ran a PSE 602 lab exercise and assisted students in Ph.D. projects involving use of cleanroom tools. When oversight of the Conte cleanroom shifted to the Institute for Applied Life Sciences, Nicolson gained campus-wide cleanroom responsibilities, and currently, he is supervising a second, newer cleanroom in the College of Engineering.

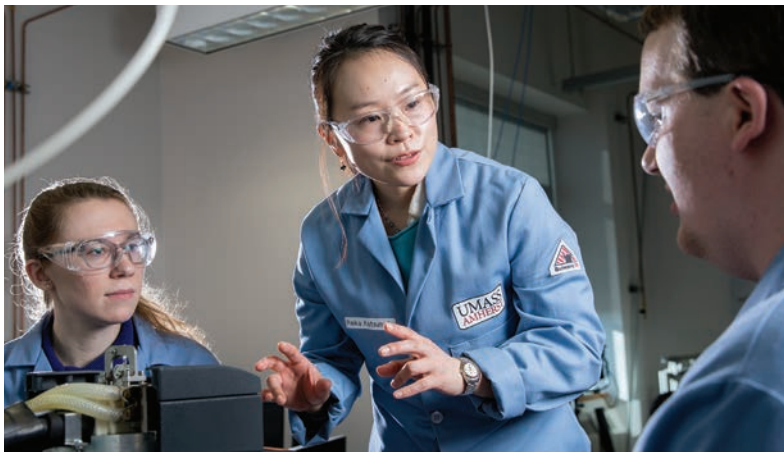
New Faculty

Laura Bradley completed her Ph.D. in Chemical Engineering at the University of Southern California working with Malancha Gupta and conducted her postdoctoral research with Daeyeon Lee and Kathleen Stebe at the University of Pennsylvania. Laura joined PSE in Fall 2017. The Bradley group (pictured below with Laura on the right) currently consists of five Ph.D. students (Eva Morgenthaler, Heather Hamilton, Robert Enright, Xiaoshuang Wei and Alex McGlasson) and two undergraduate researchers (Nicholas Sbalbi and Samuel Marsden). Research in the Bradley *HIP Materials Group* aims to **h**arness **i**nterfacial **p**henomena to develop new soft materials.



The central goal of the Bradley research program is to develop processing methods for polymer composites that leverage novel structure-function properties. The group studies composites which range from functional thin film coatings to complex colloids. Notably, important dynamics in materials processing reside at *interfaces*. Fluid interfaces in particular are advantageous platforms for materials processing due to inherent mobility that enables building blocks, and the interface itself, to evolve quickly toward equilibrium or quasi-equilibrium configurations. The research aims to control materials transport to, and accumulation at, *interfaces in open systems* using chemical vapor deposition and aim to understand the evolution of *interfaces in closed systems* during the synthesis of multi-phasic materials, specifically anisotropic colloids. The three major on-going research thrusts are: (1) exploiting internal interfaces of anisotropic polymer colloids, (2) processing polymer materials at liquid-air interfaces, and (3) developing novel vapor-phase deposition techniques for functional and conformal polymer coatings. Ongoing research in the Bradley group is currently funded by UMass Amherst start-up funds, a 3M Non-Tenured Faculty Award (2018), an American Chemical Society Petroleum Research Fund New Investigator Grant (2018), an NSF CAREER Award (2019), and the Air Force Young Investigator Program (2020). Additionally, graduate student Xiaoshuang Wei has been supported by the 2016-2017 PSE Alumni Award and the 2017-2018 Arkema Fellowship, and Robert Enright is currently supported by an NSF Graduate Research Fellowship.

Reika Katsumata is originally from Kawasaki, a suburb of Tokyo, Japan. After obtaining her B.E. and M.E. degrees in organic and polymeric materials at Tokyo Institute of Technology, she made a big move to the States where she earned her Ph.D. degree in Chemical Engineering at the University of Texas at Austin in the Ellison Group. Before joining the PSE department, she completed her postdoctoral training at the University of California, Santa Barbara in the Segalman Group.

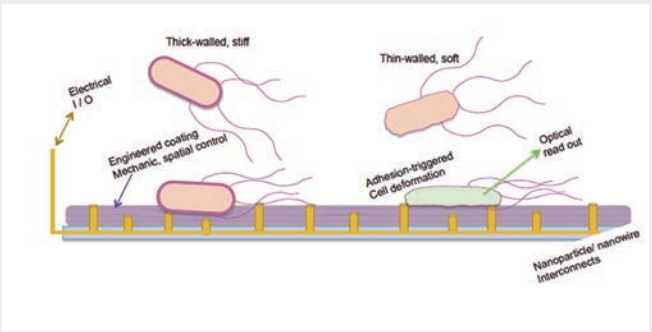


The overarching research goal of the Katsumata group (featured on the front cover of the current newsletter) is to design extremely confined soft/hard interfaces. Some examples of these interfaces include nanocomposites containing nanoparticles, ultra-thin polymer films/coatings, and two-dimensional materials with dimensions smaller than 10 nm. Despite emerging capabilities to synthesize these materials with precision, the influence of extreme confinement on the molecular-scale is not fully understood. The thermophysical properties of molecules in extremely confined systems are often governed by rules different from those of bulk and moderately confined systems (> 10 nm scale).

Research Highlights

Convergent Research Toward Bacterial-Based Smart Materials

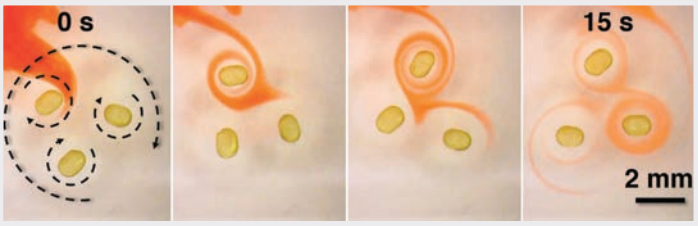
Maria Santore leads a team at UMass, recently awarded a $975,000 grant from NSF's new "Convergence Program", aiming to grow a new field of "touch-based bacterial communication". The project goal is to bridge research of soft materials, microbiology, nano-electronics and electrical signaling to determine how bacteria respond to mechanical and electrical signals. Further, they will analyze how these signals can be exploited to manipulate bacteria, with potential downstream applications in bio-remediation, pharmaceuticals and electronic medical devices. In addition to the fundamental scientific research goals, the award will support workshops organized by the UMass Amherst team for investigators around the nation to grow this research area into a sub-discipline within the scientific community.



https://www.umass.edu/newsoffice/article/nsf-supports-umass-amherst-scientists

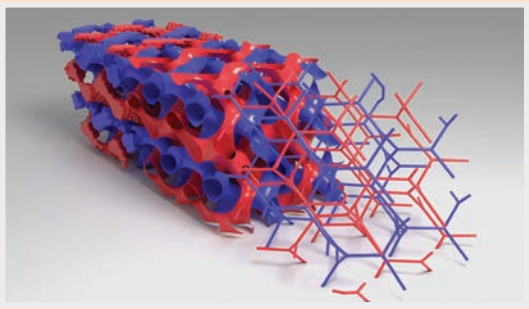
Liquid Magnets Pave the Way Towards New Steerable Fluids

A team of scientists, led by **Thomas Russell**, has discovered a new class of materials that are both liquid and magnetic. The group described their approach in a recent issue of *Science*, which integrates iron oxide and 3D printing techniques to transform semimagnetic liquids into permanent magnets, to create magnetically actuatable arrays of "liquid magnets". Because of their soft, reconfigurability, liquid magnets offer potential avenues to new technologies ranging from liquid robots to 3D-printed artificial cells for therapeutic applications.



https://www.umass.edu/newsoffice/article/materials-scientists-build-synthetic

Seeing the Double-Gyroid with Our Own Eyes

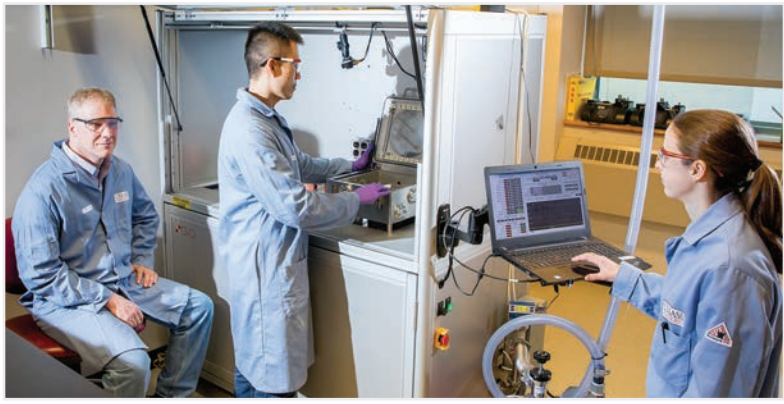


The double-gyroid is arguably the most complex phase of block copolymers and other amphiphilic assemblies. While its bicontinous structure is extremely desirable for a range of functional nanomaterials applications, its contorted geometry and tortuous topology have vexed researchers' attempts to characterize this morphology for decades. In a study published in *Nature*, **Greg Grason**, in collaboration with former PSE faculty member **Ned Thomas**, has reported a new approach to the "true" 3D structure of a block copolymer gyroid, using "slice-and-view" SEM tomography. This approach reveals an unprecedented level of quantitative detail about the morphology, spanning from a few nanometers up to 10s of microns, and leads to new insights about this gyroid as a type of "soft matter crystal".

https://www.umass.edu/newsoffice/article/revealing-real-picture-soft-self-assembled

Research Highlights

Institute of Hierarchical Manufacturing

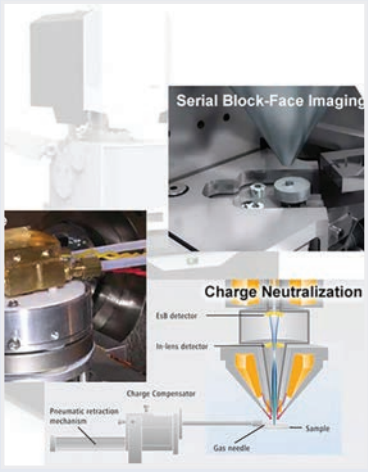


The Institute of Hierarchical Manufacturing (IHM) was awarded more than four million dollars in FYs 19 and 20 to support multi-disciplinary research in functional materials and additive manufacturing. The IHM, directed by Polymer Science and Engineering Professor **Jim Watkins**, was established in 2018 following the completion of funding for the Center for Hierarchical Manufacturing (CHM), a National Science Foundation-sponsored Nanoscale Science and Engineering Center (NSEC). Like its CHM predecessor, the IHM focuses on the development of enabling materials for electronics, advanced optics, energy storage and other applications using pathways and processing platforms that can be scaled for practical applications.

More than twenty UMass faculty from Polymer Science and Engineering, Mechanical Engineering, Chemistry, Electrical Engineering and Chemical Engineering collaborate within the IHM with support from the Department of Defense through the Army Research Lab (ARL) and other agencies as well as large and small commercial partners. Current projects include the development of optical metamaterials, flat lenses and precision optics, next generation energy storage media, materials for electromagnetic shielding, energy absorbing materials, and antimicrobials. Research for these projects ranges from the synthesis of novel precursors and materials, to fundamental studies of their unique behaviors, to their use in devices that can be produced using advanced additive manufacturing approaches including imprint lithography, 3-D printing, cold-spray deposition, rapid photothermal processing and roll-to-roll manufacturing.

Centers like the IHM take advantage of the long-standing tradition of collaborative research within PSE and at UMass as well the availability of comprehensive facilities for materials characterization and emerging technology. In late 2020, the IHM will add a high-pressure cold spray deposition facility located in the Conte Building to UMass' growing suite of advanced additive manufacturing capabilities.

Scanning Electron Microscope



Through an NSF proposal spearheaded by **Hoagland**, **Ribbe**, and **Bradley**, UMass just acquired, and is in the process of installing, a new Scanning Electron Microscope (SEM) with a host of capabilities only recently available. The new Variable-Pressure High Resolution SEM will be housed alongside other electron microscopes in the UMass Electron Microscopy Center, located in Conte and available to campus and external users.

Among the instrument's key features are:

(i) an in-chamber ultra-microtome for serial block face imaging with 3D reconstruction,
(ii) a cryo-stage reaching –150C,
(iii) an energy-dispersive x-ray spectrometer for composition mapping, and
(iv) a gas-injection option that allows for imaging at low but finite pressure and imaging of insulating specimens through charge neutralization.

These features are particularly useful in the context of soft matter and biomaterials research, areas of focus to PSE as well as the broader UMass campus.

Research Highlights

Geckskin Adhesive Invented on Campus

The University Store in the Campus Center is the first retail outlet in the nation to carry the UMass Amherst invention. Geckskin, the re-useable, super-strong adhesive inspired by the footpads and tendons of geckos that was invented by polymer scientist **Al Crosby** and his research group on campus, is now for sale at the University Store in the Campus Center, the first retail outlet in the nation to carry the UMass Amherst invention.

Rana Gupta, the strategy/finance/business development manager for Felsuma, the company formed to market Geckskin in April 2013, says, "It was very important to us to bring this home first. We feel the device has a bright future in university bookstores across the nation."

In inventing Geckskin, Crosby and colleagues, working with biologist Duncan Irschick, an expert in how lizards climb and cling, set out to figure out what gives a five-ounce gecko the adhesive power to run up a wall and across the ceiling weighing roughly the equivalent of nine pounds without slipping or falling. This led the inventors to experiment with tremendous weights; for example, an early Geckskin device the size of an index card could hold a 700-pound weight mounted on smooth glass.

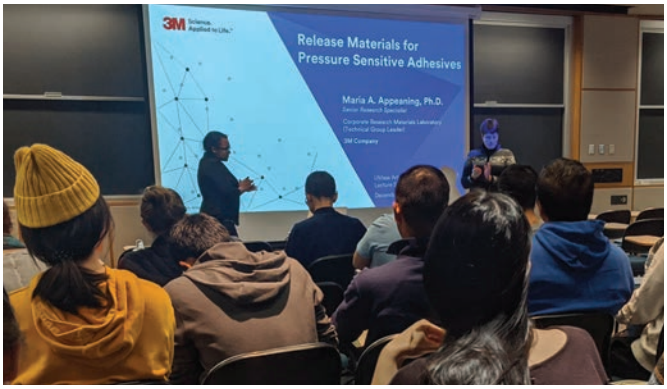
But, as Gupta explains, in practical terms when people want to hang something heavy like a TV or computer monitor on the wall, they secure it firmly and tend to leave it in place. By contrast, Geckskin's strengths and uniquely useful features are related to the fact that it's temporary and re-useable. Peeling it off won't damage the surface or paint underneath, and it can be easily and quickly applied or moved uncounted numbers of times. "We're geckos," quips Gupta, "We can go anywhere on the wall and jump off anytime we want to. There is no other technology like this anywhere in the world. The inventors proved something very important and created a completely new, truly revolutionary technology."

The Felsuma executive says the company expects most users will employ Geckskin devices such as the Griptile, Griploop and Griphook to hold objects weighing one pound or less. "We think it will be ideal for student dorm rooms and young peoples' first apartments

because it's low-cost, it can hold posters, calendars, lanyards, keys and ball caps for as short or long a time as you need but when it's time to move, it won't leave a mark behind or damage the surface at all. If you don't exceed the weight limit and there is a good grip at the surface, there is no reason for it to ever come down until you want it to," he adds. Further, "We expect consumers will come up with all sorts of uses for the devices in the bathroom, kitchen and office as well as applications in remodeling and construction. It's made of everyday materials in the United States, using standard manufacturing techniques, so it's easy on the environment too."

Geckskin has won awards as a top science breakthrough from CNN/Money/Fortune and attention from business leaders such as Bloomberg, International Business Times, MassHighTech, Huffington Post and Discover.

UMass-3M Diversity in STEM Lecture Series



In Fall 2019, Professors **Laura Bradley** and **Sarah Perry** secured an educational grant from the 3M Foundation to support a UMass-3M Diversity in STEM Lecture Series. The success of this grant was supported by collaborative input from Prof. Bryan Coughlin (PSE) and Cristina Thomas (3M).

The main goal of the lecture series is to inspire underrepresented students (undergraduate and graduate) to follow rewarding careers in STEM by hearing lectures directly from underrepresented scientists and engineers in industry, academia, and/or government institutions. Events aim to increase the diversity of invited speakers on campus while providing a space for open and constructive conversations on the obstacles faced by underrepresented groups in STEM.

In addition to highlighting the contributions of underrepresented scientists and facilitating networking opportunities for students, the lecture series provides invited speakers a platform for sharing their research and establishing collaborations at UMass Amherst.

The inaugural event in December 2019 hosted Dr. Maria Appeaning (3M) and was a fantastic start to the series. Our main metric for success is student participation. There were 75 total students who attended the seminar, a coffee hour conversation, and a networking breakfast.

The second and third events originally scheduled for Spring 2020 were rescheduled for Fall 2020. The lecture series will continue (virtually) hosting Dr. Amalie Frischknecht (Sandia National Laboratory) on September 29th and Prof. Alfredo Alexander-Katz (MIT) on October 23rd.

A second cycle of funding was recently secured which will enable the extension of the lecture series promoting further community engagement in discussions on diversity and innovation in STEM.

In Memoriam

Greg Dabkowski, longtime coordinator of PSE's outreach efforts, passed away in April, leaving his wife of 48 years, Judy, along with three children. Greg was raised in Connecticut, where he was was a star pitcher on a state-championship team, and he completed college at Central Connecticut State University, where he again played baseball but more importantly, where he met Judy, whom he married in 1971. Moving to South Deerfield, Greg started doctoral studies in the UMass Chemistry Department. After graduation in 1973, he became a Chemistry Department staff member and ran the Microanalytical Laboratory, which served the entire campus, including PSE. About two decades later, with the opening of Conte in 1995, Greg moved to PSE as Student Outreach Coordinator, a position he occupied until retirement. Most of the current PSE Outreach initiatives originated under his guidance, including ASPIRE and PSE graduate student science visits to local schools. In particular, he devised many of the simple polymer experiments still used in these programs. Greg had a deep passion for reaching K-12 students with basic science concepts, and his enthusiasm was infectious, prompting many PSE graduate students to join his efforts. Thousands of K-12 students were so reached.

Greg was an active community members and avid gardener. He also was a friend to everyone in Conte, knowing all names and always making cheerful and encouraging greetings whenever paths crossed, on- or off-campus. He positiveness and encouragement will forever remain with those who worked around him in PSE, and the outreach programs he created will benefit generations of students into the future.

PSE lost a dear alumna, scholar, and spirit on December 16, 2019 with the passing of **Irem Bolukbasi (Kosif)** at her home in St. Paul, Minnesota. Irem's enthusiasm and dedication to learning defined the type of student that makes PSE special, and unsurprisingly she became close friends with dozens of classmates and coworkers. Irem first came to Amherst as an undergraduate summer researcher from Instanbul, Turkey (on the advice of her advisor Amitaz Sanyal, a UMass alumnus), where she worked in Todd Emrick's laboratories and quickly distinguished herself as a superstar in the laboratory. In the Fall of 2010, she joined Todd's group for her thesis research, where she focused on the synthesis of functional nanoparticles, polymer surfactants, and all kinds of interfaces.

Irem's exceptionally friendly nature extended from her personal life to her professional endeavors, making her a wonderful collaborator (with researchers in Amherst, U Chicago, and U Pittsburgh) who both led and contributed to numerous profound discoveries during the course of her thesis. In her fourth and fifth years in PSE, Irem enthusiastically continued her research in the face of surgery and chemotherapy, and was able to complete a stellar Ph.D. thesis, then go on to launch successful research endeavors and products for several years at 3M in St. Paul.

We invite you to partner with us in PSE as we honor Irem's tremendous life and legacy, and in turn recognize how Irem sets the standard for the intellectual, collaborative, and friendly culture that is the lifeblood of PSE.

PSE Graduates, *February 2017 – July 2020*

2020

Daria Atkinson (G. Grason; C. Santangelo) July 15, 2020
Filaments, Fibers, and Foliations in Frustrated Soft Materials

Christopher Barney (A. Crosby) June 10, 2020
Theory and Improved Methods for Probing the Cavitation to Fracture Transition

Alexa Kuenstler (R. Hayward) June 8, 2020
Photothermal and Photochemical Strategies for Light-Induced Shape-Morphing of Soft Materials

Hyunki Kim (T. Emrick; R. Hayward) May 5, 2020
Synthesis of Functional Nanocomposites and Light-induced Assemblies at Interfaces

Qi Lu (R. Hayward) March 11, 2020
Nano- and Micro-structured Temperature-sensitive Hydrogels for Rapidly Responsive Devices

Yige Gao (D. Hoagland; T. Russell) February 20, 2020
Nanoparticle Assemblies at Liquid Interfaces as Revealed by Scanning Electron Microscopy Applied Materials

Brendan Ondra (A. Lesser) January 30 2020
Characterizing Non-linear Structural, Mechanical, and Volumetric Properties of Aliphatic and Aromatic Thermosets

2019

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Thermodynamics of Polyelectrolyte Solutions and Polymer Crystallization

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Bioinspired Complex Nanostructures by DNA Supramolecular Polymerization

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Self-exfoliatin and Reactive Polymer (SERP) as a Protection Against Chemical Warefare Agents (CWAs)

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Double-Network Materials via Frontal Polymerization & Supercritical CO2 Processing

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Modification of Two Dimensional Materials Utilizing Functional Polymer Interfacial Layers

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Rheological Investigations of Self-Assembled Block Copolymer Nanocomposites with Complex Architectures

Cristiam Santa Chalarca (T. Emrick) November 20, 2018
Reactive and Stimuli-responsive Sulfonium-based Polymer Zwitterions

Molly Shave (M. Santore) October 22, 2018
Interfacial Interactions and Dynamic Adhesion of Synthetic and Living Colloids in Flow

Yiliang Zhou (K. Carter; J. Watkins) October 15, 2018
Direct Printing/Patterning of Key Components for Biosensor Devices

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Targeted Design of Co-continuous Nanostructures in Copolymers

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Bio-inspired Polymers that Bind and Deliver Protein Cargo

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Direct Patterning of Nature-Inspired Surfaces for Biointerfacial Applications

Aditi Naik (J. Watkins) September 5, 2018
Direct Printing of Conductive Inks for Organic Electronics and Wearable Microfluidics

Kara Martin (K. Carter) August 8, 2018
Film Stabilization and Photo Physics of Unconventional Conjugated Polymers

Jack Ly (A. Briseno) August 3, 2018
Chemical Stability and Performance Influence of Choice Substituents and Core Conjugation Of Organic Semiconductors

Rohit Gupta (E.B. Coughlin) July 30, 2018
Investigating the Role of Topological Frustration on Morphology of Novel Multiblock Copolymers

Prabhat Tripathi (M. Muthukumar) July 18, 2018
Voltage-Driven Polyelectrolyte Complexation Inside a Nanopore

Chinomso Nwosu (E.B. Coughlin) June 15, 2018
The Balance Between Dipole-Dipole Interactions and Steric Exclusion on Ordering in Cationic Polymers

Madhura Pawar (A. Lesser) June 11, 2018
Engineering High Performance Thermosets via next Generation Impact Modification

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Swelling Induced Deformation of Thermally Responsive Hydrogels

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Extreme Indentation and Fracture of Soft Polymer Gels

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Fabrication of High-Refractive Index, Periodic, Composite Nanostructures for Photonic and Sensing Applications

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Rheological Properties of a Model Soft Solid Nanocomposite

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Increasing Organic Semiconductor Performance Through Chemical and Processing Modifications

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Defining and Manipulating the Function of Protein Kinase C-Theta in Graft Versus Host Responses

2017

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Self Assembling Networks in Soft Materials

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Complex Ground States of Vortices and Filaments

Coralie Backlund (G. Tew) November 21, 2017
Polymeric Peptide Mimics for Protein Delivery

Nihal Kanbargi (A. Lesser) November 16, 2017
Engineering Next Generation Anisotropic Materials and Composites

Matthew Skinner (T. Emrick) September 8, 2017
Synthesis of Novel Zwitterionic Polymers: From Functional Surfactants to Therapeutics

Haomiao Yuan (E.B. Coughlin) August 4, 2017
Synthesis and Structure-Property Relationships of Polymeric Membranes for Small Molecule Transport

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The Role of Chain Configuration in Governing the Rational Design of Polymers for Adhesion

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Synthesis and Characterization of Imidazole-Containing Conjugated Polymers

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Polyorganosiloxanes: Molecular Nanoparticles, Nanocomposites and Interfaces

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Molecular Design, Characterization, and Implementation of Organic Semiconducting Oligothiophenes

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Dynamics and Structure of Polyelectrolyte Complexes

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Solution-based Assembly of Conjugated Polymers into Nanofibers for Organic Electronics

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Guiding the Self-Assembly of Block Copolymers in 2D and 3D with Minimal Patterning

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Interactions at the Aqueous Interface of Large-Area Graphene: Colloidal-Scale and Protein Adsorption

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Formation of a Crosslinked High Performance Material Using a Highly Dense Reactive MixtureAnalysis of Densely Crosslinked Phyenolic Systems Using Low Field NMR

Michael Leaf (M. Muthukumar) April 25, 2017
Conducting Polyelectrolyte Complexes: Assembly, Structure, and Transport

Shengkai Li (J. Watkins) April 25, 2017
Fabrication of Functional Nano-Materials and Devices Using Supercritical Fluids

Nakul Bende (R. Hayward) April 6, 2017
Non-Euclidean Shells: A Study of Growth-induced Fabrication and Mechanical Multi-stability

Yue Gai (J. Watkins) April 6, 2017
Synthesis, Characterization and Application of Block Copolymer and Nanoparticle Composites

Adam Hauser (R. Hayward) March 30, 2017
Nanocomposite Polymer Networks for Reconfigurable Materials

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Structure-property Relationships of Hierarchical Polymer Materials

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