Director Mark Banaszak Holl’s Message

Dear Alumni and Friends,

The Macromolecular Science and Engineering program is busy planning for its 40th Annual Symposium. This year’s theme will be “Macromolecules and Innovation - From Discovery to Product”. We are excited to have a number of new events surrounding this symposium. The research talks, poster session, and banquet will occur on Thursday, October 27th; however this year we will also have a serveral sessions focused on the development of new Innovations! on Wednesday, October 26th.

This will include sessions on intellectual property, presentation, and public engagement. Please give me a call if you are a Macro alum in the business world and would like more information regarding this great opportunity to teach our current students about Innovation! and network with a great bunch of polymer scientists and engineers!

Speaking of next fall, Macro has a wonderful new incoming class for the fall of 2016! With a total of 11 Ph.D. students this high quality class sets a record for size and for the number of students entering the program with fellowship support. We also will have three new Master’s students. We are extremely excited about the arrival of this exceptional new cohort of students, you can read more about them in the newsletter.

This year Macro Coordinator Adam Mael piloted a new peer-to-peer mentorship program for incoming Macro graduate students. This was one of the many interesting insights Adam has brought to the program arising from his own graduate pursuits in the area of academic administration. Based on our evaluation of last year’s efforts we are expanding the program with the addition of current Ph.D. student Leanna Foster (Kuroda) to the organizing team.

Leanna served last year as President of the ACS POLY/PMSE student chapter and was recognized by both the College of Engineering and Macro for her leadership efforts. We are delighted she will contribute to the mentorship program in the upcoming year.

The Macro student’s efforts over the past year to reach out to our local public schools to teach polymer science and engineering were spectacular.

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Director’s Message (CONTINUED FROM PAGE 1)

With Rose Cersovsky (Glotzer) providing invaluable leadership, the Macro Ph.D. and Master’s students, along with additional students recruited from other graduate programs, taught classes in 16 elementary, middle, and high schools in Detroit Public Schools and other metro area school systems.

I was fortunate enough to participate on two occasions and came away thoroughly impressed with the school teachers, the students, and the efforts our Macro graduate students are making towards K-12 education. The Macro faculty voted three times last year in support of these efforts. The first time to provide conference travel awards to some participants, the second time to grant the first ever Prof. Albert and Yee Student Leadership awards (for which these efforts were a substantial consideration), and the third time with their feet (Kuroda, Larson) by participating in school visits. I would like to particularly thank Ryan Hall (Larson) and Harry van der Laan (Scott) for the exceptional participation in the school visits.

Congratulations are also in order for a few Macro alumni. Cheol Park (Robertson) was a recipient of the 2016 NASA Governor Inventor of the Year Award for inventing a way to make boron nitride nanotubes. Professor Alan Sellinger (Laine) recently received a promotion to Associate Professor of Chemistry at the Colorado School of Mines. We encourage all our wonderful alumni to keep us updated on their accomplishments!

Please join me in wishing farewell to Prof. Peter Green, who joined Macro, Materials Science, and Chemical Engineering at the University of Michigan in 2005. During his time at Michigan Prof. Green served as Chair of Materials Science and Engineering, President of the Materials Research Society, and was the PI of a DOE Energy Frontier Research Center for Solar and Thermal Energy Conversion. He is moving on to a new role as Deputy Laboratory Director for Science and Technology at the National Renewable Energy Laboratory. This is a critical area of science and engineering and we wish him the best of luck in his new efforts!

Please also join me in welcoming three new faculty members to Macro. With the addition of Prof. Joseph Corey, MD, Prof. Omolola Eniola-Adefeso, and Prof. Jan Stegemann Macro is substantially improving its footprint in the area of biological applications of polymers and biological macromolecules as materials. We are excited to build in this area of considerable research strength within Macro and the University.

Best wishes for the summer!

Mark Banaszak Holl
Nano-shells Deliver Molecules That Tell Bone To Repair Itself
Jerry Mastey, Michigan News

Scientists at the University of Michigan have developed a polymer sphere that delivers a molecule to bone wounds that tells cells already at the injury site to repair the damage.

Using the polymer sphere to introduce the microRNA molecule into cells elevates the job of existing cells to that of injury repair by instructing the cells’ healing and bone-building mechanisms to switch on, said Peter Ma, Professor of Dentistry and lead researcher on the project.

Sakamoto Receives $3.5 Million From Department of Energy
Mcro Professor Jeff Sakamoto is the recipient of a $3.5 million grant from the Department of Energy to work on “transformational” engine and battery projects. The grant comes from the DoE Advanced Research Projects Agency, ARPA-E, and will support Sakamoto’s research on advanced batteries beyond lithium-ion batteries.

“Transitioning society away from fossil fuels will require more advanced batteries, especially for vehicle electrification”, Sakamoto said. This new generation of batteries would be nonflammable and have wide uses in vehicles and on the electrical grid for storage applications.

Quotes obtained courtesy of Amy Mast.
Carbon-neutral Process Turns Rice Waste Into Silica

Gabe Cherry, Michigan News

Producing high-purity silicon compounds is today an expensive and carbon-intensive process that requires heating mined silicon metal and anthracite coal to 3500 degrees Fahrenheit in an electric arc furnace. That could soon change, thanks to a new technology that can produce the same silica compounds from agricultural waste.

Developed by U-M Materials Science and Engineering Professor Richard Laine, the new technique is believed to be the first simple, inexpensive chemical method for producing high-purity silica compounds from agricultural waste. Laine says it could save approximately six tons of carbon emissions per ton of silica compounds produced. He estimates the cost of the technique to be 90 percent less than the current process, with virtually no carbon footprint.

Much of the world’s agricultural waste contains silica, and the search for a practical way to extract it stretches back 80 years. While the new process could be used to produce silica and silicon-containing chemicals from many types of agricultural waste, Laine says it could save millions per year every time this second solution and used to make a high-purity precipitated silica product for industrial use.

Laine has formed a Michigan company, Mayasil, to commercialize the technology. Headquartered in Ann Arbor, it’s in the process of building a “pre-pilot” plant that will be used to develop a scaled up manufacturing process. If the scale-up is successful, Laine predicts that it will fundamentally change the way silica products are made and used.

“I think eventually, we’ll be producing high-purity silica and other silicon compounds right next to the rice fields,” Laine said. “It will be possible to process rice and produce high-grade silica in a single location with little or no carbon footprint. It’s really very exciting.”

Peter Green - Professor Green recently accepted a position as the Deputy Laboratory Director for Science and Technology at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. He will begin to transition to this exciting new role in the summer after ten years as a College of Engineering faculty member. Congratulations Professor Green!

L. Jay Guo - Professor Guo was featured earlier this year in a series of videos made by NBC Learn and NSF about nanotechnology. One video, ‘Nanotech at the Surface’, highlighted research in the Guo lab focusing on coating technology and ways to control how light interacts with the surface of an object.

Jinsang Kim - Professor Kim received the 2016 College of Engineering Monroe Brown Foundation Research Excellence Award for his sustained excellence in both research and other scholarly activities. Professor Kim maintains a very active group with heavy involvement from Macro Ph.D. students.

Nicholas Kotov - Professor Kotov was selected as the recipient of the 2016 College of Engineering Rexford E. Hall Innovation Excellence Award. The award recognizes Kotov’s translational research that has resulted in several start-ups and licenses, including Elegus Technologies.

Ariella Shikanov - Professor Shikanov has been chosen as a recipient of 2016 NSF CAREER funding, a prestigious program which supports junior faculty “who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research”. The research of Professor Shikanov’s lab aims to “create artificial constructs that direct tissue regeneration and restore biological function”. The funded CAREER proposal will help support work to discover key signaling factors involved in early stage development of ovarian follicles.
ACS POLY/PMSE Student Chapter

The Winter 2016 term marked the end of an eventful and productive year for the ACS POLY/PMSE chapter. The group hosted several visiting speakers, professional development events, and continued outreach to area schools.

Professor Jay Schieber, Illinois Institute of Technology - Professor Schieber was the first faculty speaker of the Winter term, his talk “Rigorous Theoretical Modeling of Entangled Polymer Dynamics Told Through Pictures” drew a crowd of both Macro and Chemical Engineering students.

Professor Lei Li, University of Pittsburgh - Professor Li was hosted as part of a joint seminar hosted by the ACS POLY/PMSE Chapter and the Chemistry Department. Professor Li, a Macro alumnus (2001, Yee), returned to campus to present his talk, “Understanding the Intrinsic Water Wettability of Graphene and Other 2D Materials”.

Professor Zhenan Bao, Stanford University - Professor Bao’s seminar was the third and final of the term and was jointly hosted by the ACS POLY/PMSE Chapter and Chemical Engineering. The seminar, which drew nearly 100 attendees, discussed “Skin-Inspired Electronic Materials and Devices”.

Outreach & Professional Development

The student outreach program that began as a small effort last winter has blossomed into an active and in-demand series of presentations. This year ACS POLY/PMSE outreach efforts reached 1,000 students at 16 schools in the Metro Detroit area. Participating students were entered to win one of four $500 Overberger Conference Fellowships. Simon Adorf (ChE) Ted Ahn (Macro), Megan Dunn (ChE), and Sam Navarro (Macro) were selected as winners.

Macro students Rosy Cersonsky, Leanna Foster, Ryan Hall, and Harry van der Laan were awarded Professor Albert & Mrs. Yee Student Leadership Awards ($500) for their outstanding contributions to the ACS POLY/PMSE chapter and Macro program.

The student chapter continued to remain active with other on-campus events. In January they held a ‘Fundamentals of Polymers Boot Camp’ over two weekends. During these workshops current Macro Ph.D. students taught a range of introductory polymers concepts to a diverse group of undergraduate and graduate students.

In April the chapter partnered with the Huron Valley Toastmasters to hold a workshop titled, “Preparing for Presentations”. The Toastmasters gave presentation advice and provided feedback to students on short research presentations.

ACS POLY/PMSE 2016-17 Student Chapter Leadership

President: Harry van der Laan
Vice President: Ryan Hall
Treasurer: Ted Ahn

Macro Student News - Ph.D. Graduates

Kyeongwoon Chung (Jinsang Kim) - In April Kyle defended his dissertation, “Design of Organic Materials with Unique Supramolecular Assembly for Optical, Electronic, and Biomedical Applications”. In 2015 Kyle was winner of the Overberger Student Research Award at the 39th Annual Symposium.

Priyanka Desai (Ronald Larson) - Priyanka’s dissertation, “Quantitative Modeling of Entangled Polymer Rheology: Experiments, Tube Models, and Slip-Link Simulations” was defended in late December. She recently began a Research Scientist position with Shell in Houston.

Jiwon Kim (Ariella Shikanov) - Jiwon completed his degree in April and is the first Macro Ph.D. graduate from the Shikanov Lab. His dissertation was titled, “Functional and Tunable Synthetic Hydrogel for Reproductive Tissue Engineering”.

Taisuke Kojima (Shuichi Takayama) - In January Tai defended his dissertation, “Development of Microcompartmentalization Using Macromolecules and Liquid-Liquid Interfaces. Tai accepted a postdoctoral fellowship position at the University of Freiburg (Germany) in the Department of Microsystems Engineering.

Samanthule Nola (Sharon Glotzer) - Sam is the first Macro Ph.D. graduate from the Glotzer Lab. She successfully defended her dissertation, “Clustering and Nucleation in Metastable Fluids of Hard Polyhedra”, in May.

Ashwin Panday (L. Jay Guo) - Ashwin completed his degree in January with a defense of his dissertation, “Electrostatics Confinement, Patterning, and Manipulation of Charged Nanoparticles by Combining Nanostructured Surfaces and Ionic Charge Regulation”. Ashwin accepted a position with Michron and Apple in Boise, Idaho and got married later in June. Congratulations Ashwin!

Dena Shahriari (Jeff Sakamoto) - Dena transferred to the Macro program in January 2015, joining Macro along with Professor Sakamoto. In April she completed her defense, “Degradable Microchannel Nerve Guidance Scaffolds for Central and Peripheral Nerve Repair”.

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Macro Student News - Current Students

Leanna Foster (Kenichi Kuroda) - As President Leanna led the ACS POLY/PMSE Chapter to a very successful year while also contributing to recruitment and outreach efforts. Leanna’s remarkable work did not go unnoticed, she was selected as a recipient of the 2015-16 Distinguished Leadership Award from the College of Engineering. In the fall Leanna will work as a student leader to help organize a peer mentorship program within Macro.

Midori Maeda (Kenichi Kuroda) - A past recipient of the College of Engineering Master’s Fellowship, in February Midori received scholarship support from the Hispanic Scholarship Fund. This summer Midori is interning with Boeing in South Carolina.

Apoorv Shanker (Jinsang Kim) - Apoorv was chosen as a Rackham Predoctoral Fellow for the 2016-17 school year. This prestigious Rackham fellowship will support Apoorv during the coming academic year and summer.

H.J. Yoon†, A. Shanker†, Y. Wang, M. Kozminsky, Q. Jin, N. Palanisamy, M.L. Burness, E. Azizi, D.M. Simeone, M.S. Wicha, J. Kim, and S. Nagrath. “Tunable Thermal-Sensitive Polymer–Graphene Oxide Composite for Efficient Capture and Release of Viable Separators to a Startup Company, Elegus Technologies, where he is the Chief Technology Officer of the company. Apoorv is also a recipient of the Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement. As a Ph.D. student Apoorv focused on the design of stimuli-responsive hydrogels for drug delivery applications.

Siu on Tung (Nicholas Kotov & Levi Thompson) - In February Siu on received the Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement. As a Ph.D. student Siu on has had a strong academic and research record, translating his research on battery separators to a start-up company, Elegus Technologies, where he is the Chief Technology Officer of the company. Apoorv is also a recipient of the Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement. As a Ph.D. student Apoorv focused on the design of stimuli-responsive hydrogels for drug delivery applications.

Jihyeon Yeom (Nicholas Kotov) - Jihyeon was selected as a Barbour Scholar for the 2016-17 academic year. This is one of Rackham’s most competitive fellowships, which recognizes outstanding graduate female researchers and students. The fellowship will provide full sup-

Scott Zavada (Timothy Scott) - In March Scott attended the ACS National Meeting in San Diego where he helped recruit for Macro and make a presentation, “Fabrication of chitosan-based hydrogels via enzyme-mediated thiol-ene polymerization”. In April he was invited to give the keynote speech at the Phi Kappa Phi Honor Society induction ceremony.

Scott is preparing to defend his dissertation this summer and afterward will begin a position at the National Institute of Aerospace in Virginia.

Macro Student News - Fall 2016 New Students

Markia Bowe (Master’s) - This spring Markia finished her Bachelor’s in Mechanical Engineering at Kettering University. Markia has conducted bioengineering research at both Kettering and at Henry Ford Hospital in Detroit.

Abhishek Dhyani (Ph.D.) - Abhishek studied Polymers at the Delhi Technological University. He is interested in polymer thin film research in addition to polymer composites for aerospace and defense applications.

Nisha Hollingsworth (Ph.D.) - Nisha has a Bachelor’s in Chemistry from Columbia and recently finished a Master’s in Biotechnology at Brown. She looks to conduct work in polymeric biomaterials while at Michigan.

Dukhan Kim (Master’s) - Dukhan earned his Bachelor’s and Master’s in Chemistry from Yonsei University. For the past several years he has worked as a researcher for Samyang Chemical Research & Development.

Taesu Kim (Ph.D.) - Taesu earned his Bachelor’s in Electrical Engineering from Hanyang University followed by a Master’s at Seoul National University. Since 2005 he has worked as a researcher at LG Chemical.

Ying Liu (Ph.D.) - Ying completed her Bachelor’s in Macromolecular Science & Engineering from Sichuan University where she has had a variety of research experiences and authored a publication.

Ayşe Muñiz (Ph.D.) - Ayşe just completed her Bachelor’s in Biochemistry from the University of New Mexico. She is currently the President of the UNM SACSNAS Chapter and was selected as a NSF GRFP recipient.

Chuma Nweke (Ph.D.) - Chuma earned his Bachelor’s from Georgia Tech in Materials Science and this spring completed a Master’s from Tuskegee University. He is interested in working in tissue engineering and regenerative medicine.

Naoki Oguri (Ph.D.) - Naoki completed his Bachelor’s in Chemistry and Master’s in Materials Science from Gunma University. Naoki has already moved to Ann Arbor and is working with Professor Laine this summer.

Laura Saunders (Ph.D.) - In May Laura completed her Bachelor’s in Chemical Engineering from the University of Buffalo. Laura has past experience working on projects utilizing polymers in bio-sensing applications and plans to conduct research in polymeric materials with applications in energy and medicine.

Alyssa Travitz (Ph.D.) - Alyssa comes to Macro by way of Cornell University, where she earned her Bachelor’s in Materials Science. In addition to her undergraduate experiences Alyssa spent two summers working in Product Design at Johnson & Johnson.

Thomas White (Ph.D.) - Thomas completed his Bachelor’s in Mechanical Engineering from Central Michigan University this spring. He brings to Macro several years of research experience including time at Michigan’s Lurie Nanofabrication Facility.

Nathan Wood (Master’s) - Nathan is a recent Chemical Engineering graduate from Michigan and joins Macro as part of the SUGS program, which will allow him to complete his Master’s with just one extra year of study.

Yingying Zeng (Ph.D.) - Yingying earned her Bachelor’s in Chemistry at Sichuan University followed by a Master’s at Ohio State. Since finishing her degrees in 2014 Yingying worked in the Langer Lab at MIT.
Support Macromolecular Science & Engineering

Each year we strive to offer our students the best possible education and research opportunities. Your gift to the program provides the funding for that margin of excellence that prepares our graduates to compete in today’s world and make substantial contributions to society.

We are grateful for your continued support of the Macro program and count on you to help us offer these exceptional opportunities!

Macro has several endowed scholarships and awards that are given in honor of Macro founder Charles G. Overberger, former Director Frank E. Filisko, and longtime Macro Coordinator Nonna Hamilton.

We invite you to visit www.macromolecular.umich.edu/giving to contribute and learn more about the ways in which your gift can support Macro. You may also give by calling 888-518-7888.

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