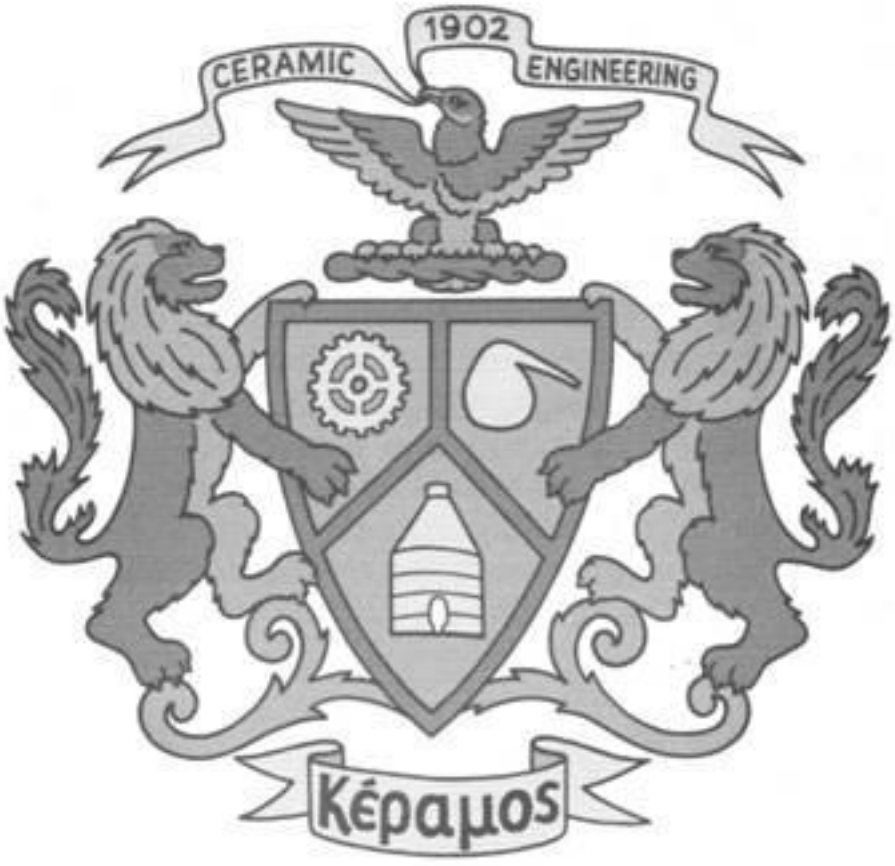
The University of Connecticut Chapter of Keramos

2014-2015 Annual Report



Submitted on: 04/16/2015

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Chapter Advisor Executive Summary

I am glad that the “University of Connecticut chapter of Keramos” was formally announced in the last MS&T’13 meeting. The chapter has been a very active and now recognized as an active student organization of UCONN. Officers have organized several events and working hard to attract more students and advertise the chapter goal and mission. With our chapter dedication to developing leaders in the fields of science and engineering, with a focus on the use of ceramics in modern life; we hosted four events in this year: Ice Cream Summer Social, Micrograph Contest, UConn Keramos Micrograph Contest Ceremony and Play with Clay Pottery Session. These are the first time happening events with a huge success and praise at the University of Connecticut.

Overall, I see a bright future of our new chapter at the University of Connecticut, and we plan to move forward and organize few more exciting events throughout the year and attract large number of students.

Faculty Advisor of University of Connecticut chapter of Keramos
Professor Prabhakar Singh

List of Officers

Keramos Executive Board (2014-2015)

President
Sapna Gupta
Address: [redacted]
Phone: [redacted]
[redacted]*@uconn.edu*

Vice President
Austin McDannald

[redacted]@uconn.edu

Treasurer
Nasser Khakpash

[redacted]@uconn.edu

Secretary
Alan Harris

[redacted]@uconn.edu

Herald
Chen Jiang

[redacted]*@gmail.com*

List of Active Members

Graduate Students

Sapna Gupta
Austin McDannald
Alan Harris
Nasser Khakpash
Chen Jiang
Sourav Biswas*
Cheng Diao
Yomery Espinal*
Matthew Janish
Rishi Kumar
Manuel.Rivas**

* Initiated Spring 2015
** will be initiated soon

Faculty Advisor

Prabhakar Singh

Chapter Activities

First Event - Ice Cream Summer Social

An ice cream summer social was held in August 2014. We worked in conjunction with the Society of Plastic Engineers. The summer ice cream social event was organized to appreciate the hard work and outstanding contributions of each member in the IMS family. All the students, faculty and staffs were invited to the event. Overall the event was a success. Chocolate, Vanilla and Husky tracks flavors were offered with number of toppings, soda and water. About 100 students/faculty/staff were in attendance from the Institute of Material Science (IMS) and made the event successful.

Below mentioned are some images of the event:

Second Event: UConn Keramos Micrograph Contest

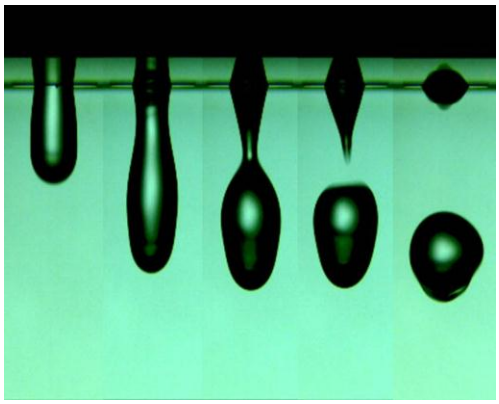
To highlight the importance of microscopy techniques and appreciation of the plethora of research at IMS, in the fall of 2014 our chapter hosted a micrograph contest. Submission was open to both undergraduate and graduate students. The micrographs were judged from both a technical and artistic perspective. The judges included several microscopy experts at IMS. Cash prizes were offered to the top three winners ($100- First Place, $75- Second Place, $50- Third Place). In total there were 18 submissions. Winners were announced in the December.

Submissions were judged on artistic and technical merit by Drs. Roger Ristau and Lichun Zhang, Institute microscopists, and Associate Professor Bryan Huey. First place went to Sourav Biswas and David Kriz for their micrograph of copper-doped mesoporous manganese oxide, entitled "Brain in Jar." Yang Guo won second place for her shot of jetting printer ink using stroboscopic imaging. Coming in third was Paiyz E. Mikael for her image of a composite scaffold designed for load-bearing bone tissue regeneration.

UConn Keramos would like to thank all the students for their participation, judges for their wisdom and expertise, and the support provided by the Institute of Materials Science, Center for Clean Energy Engineering and Materials Science and Engineering.

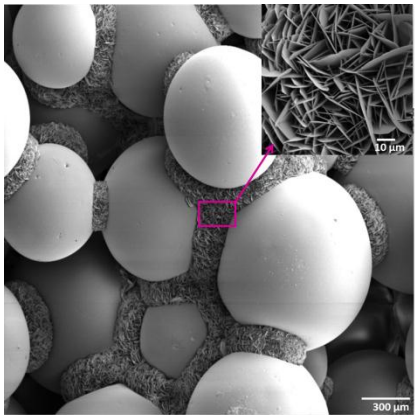
Short description (Brain in Jar): The material studied is copper doped mesoporous manganese oxide. The material was synthesized by inverse micelle soft templated approach as mentioned for recently developed University of Connecticut (UCT) mesoporous materials. The SEM picture was taken by A Zeiss DSM 982 Gemini field emission scanning electron microscope (SEM) with a Schottky emitter at an accelerating voltage of 2.0 kV and a beam current of 1.0 mA. The porous network in the material was clearly observed having shapes of nanobrains. Bell jar was photographed using a digital SLR camera. Composite image was created using GIMP and Adobe Lightroom.

Sourav Biswas and David Kriz, Ph.D. candidates, Department of Chemistry, UConn



Short description (Stroboscopic-Imaging-Jetting-Behavior): Inkjet printing is an additive manufacturing method providing high speed, versatility in materials and the capability of creating complex structures. However, most functional materials are non-Newtonian fluids whose behavior is complicated at the operating frequency (KHz). Here, the jetting behavior is correlated with the liquid properties to understand the fundamentals of inkjet printing and develop empirical models for complex fluids. A liquid jet traveling at a speed of a meter per second was captured using the stroboscopic technique. This technique allows high temporal and spatial resolution without expensive high-speed cameras.

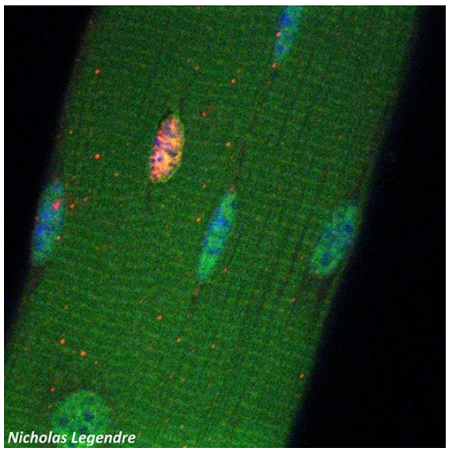
Yang Guo, Ph.D. candidate, Polymer Program, Institute of Materials Science, UConn



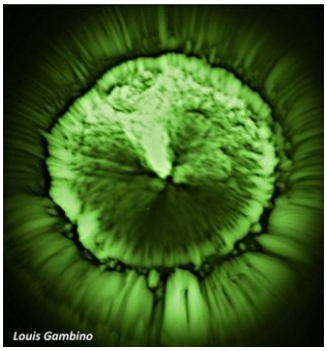
Short description (PLGA-MWCNTs Composite Scaffold for Bone Regeneration): This image shown here represent a composite scaffold designed for load-bearing bone tissue regeneration. Each microsphere is composed of poly(85% lactic-co- 15%glycolic) acid (PLGA) and functionalized multi-wall carbon nanotubes (MWCNTs). The microspheres are thermally sintered into 3-dimentional matrix. The MWCNTs not only improve the mechanical properties of PLGA scaffolds but also the physical presence of MWCNTs played a role in the calcium ion nucleation and growth.

Paiyz E. Mikael, Ph.D. candidate, Materials Science and Engineering (MSE), Institute for Regenerative Engineering, UConn

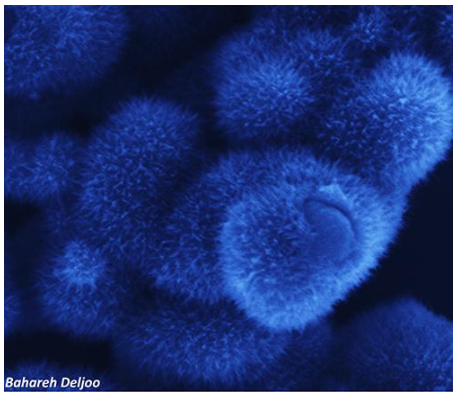
Below mentioned are other top beautiful micrograph contest entries and their description:



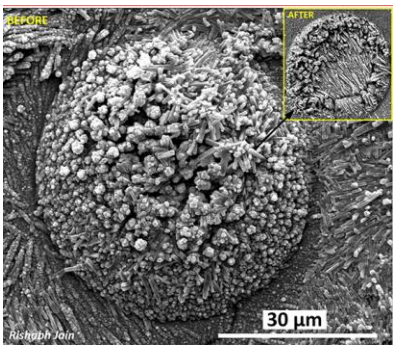
Mouse-Myofiber: Never let it be said that materials scientists get to have all the fun when it comes to microscopy. MCB graduate student Nicholas Legendre took this picture of a muscle fiber from an injured mouse. Everything that's green in the picture has expressed a gene, MyoD, involved in muscle regeneration. Legendre wanted to see if adult muscle stem cells could express MyoD and remain distinct, or whether they would inevitably fuse into the muscle. This picture answers that question with a yes! The pinkishpurplishyellow cell in this image is an adult muscle stem cell that has expressed MyoD after an injury, but still sits separately on the fiber. Legendre used a confocal microscope to get this shot, which would have been impossible with a regular fluorescent microscope. The confocal microscope uses a pinhole to eliminate outoffocus light. And unlike a regular optical microscope, it can focus at any depth within a sample, instead of just at the surface.



My Moon, My Sun: When Louis Gambino walked into the TEM lab one day to image some samples, he found the TEM's lanthanum hexaboride filament in the beginning stages of death. So instead of imaging his sample, he took a picture of the filament itself. He calls it My Moon, My Sun. Why? "Because the TEM is my moon and my sun," Gambino said. A more honest statement of the TEM's contribution to material science research is seldom heard.



Vagrant-Sea-Urchins: This is a picture of the first sample Deljoo ever collected. It's octahedral molecular sieve manganese oxide. The sheets of manganese oxide molecules link to make tunnels, a very porous structure with a lot of surface area. She took this image just to get practice with the SEM. When you zoom in, the 'fur' on the 'sea urchins' is actually plates or rods of manganese oxide. Each sea urchin contains lots and lots of these plates and nanoparticles, which are huge compared to the actual manganese oxide molecules. "Why is it blue? I like blue, and it goes with the sea urchins," Deljoo says. A Transmission Electron Microscope (TEM) uses electrons like an SEM, but it shoots them through an ultrathin sample. The electrons interact with the sample, altering their amplitude and phase. These changes are then translated into the image we see. In order to work properly, the electrons must be extracted from the very tip of the TEM's filament. But as the filaments age, they start to flake and splinter and electrons start to shoot off erratically, making them useless.



Microbubble: This image shows two droplets of a platinum salt solution that dried into flower blossom-like structures on the plate. The one on the left kept its shape in the SEM, while the one on the right collapsed. The blossom structure was undesirable for what Jain was trying to look at. But sometimes accidents are beautiful. As Jain says, "This was a bad experiment, but a pretty picture!"

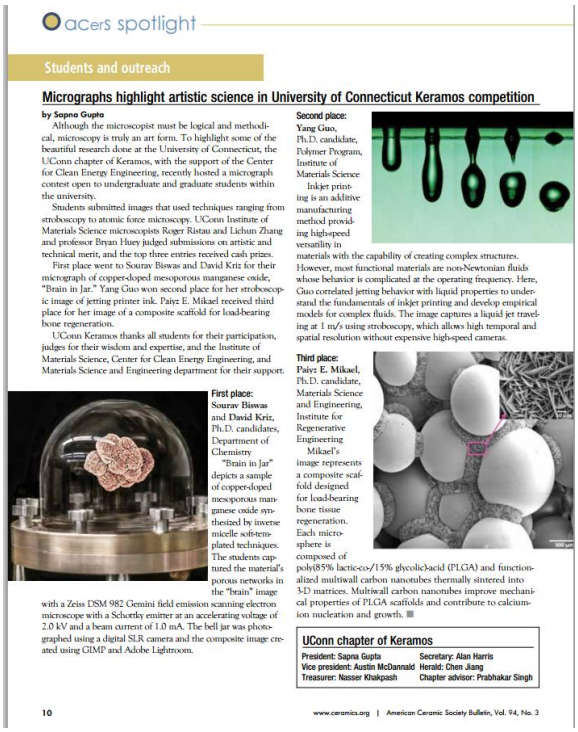
Third Event: UConn Keramos Micrograph contest ceremony

UConn Keramos organized an award ceremony for the micrograph contest in March 2015. All the IMS students, faculty and staffs were invited. Prof. Singh (Chapter advisor) presented the certificates and cash prizes to the top three award winners. A gift of appreciation was also presented to the contest judges.

Sourav Biswas (First Winner, second left) with Prof. Singh (Advisor, second right), Sapna Gupta (President, rightmost) and Austin McDannald (Vice president, leftmost)

Judges: Dr. Roger Ristau (third left), Dr. Lichun Zhang (second left), Prof. Bryan Huey (third right) with Prof. Singh (second right), Sapna Gupta (rightmost) and Austin McDannald (leftmost).

A featured article "Micrographs highlights artistic science in University of Connecticut Keramos Competition" was published in the ACerS Bulletin (April 2015) on the successful story of the micrograph contest.



acers spotlight

Students and outreach

Micrographs highlight artistic science in University of Connecticut Keramos competition

by Sapna Gupta

Although the microscopist must be logical and methodical, microscopy is truly an art form. To highlight some of the beautiful research done at the University of Connecticut, the UConn chapter of Keramos, with the support of the Center for Clean Energy Engineering, recently hosted a micrograph contest open to undergraduate and graduate students within the university.

Students submitted images that used techniques ranging from stroboscopy to atomic force microscopy. UConn Institute of Materials Science microscopists Roger Ristau and Lichun Zhang and professor Bryan Huey judged submissions on artistic and technical merit, and the top three entries received cash prizes.

First place went to Sourav Biswas and David Kriz for their micrograph of copper-doped mesoporous manganese oxide, "Brain in Jar." Yang Guo won second place for her stroboscopic image of jetting printer ink. Paiyz E. Mikael received third place for her image of a composite scaffold for load-bearing bone regeneration.

UConn Keramos thanks all students for their participation, judges for their wisdom and expertise, and the Institute of Materials Science, Center for Clean Energy Engineering, and Materials Science and Engineering department for their support.

First place:
Sourav Biswas and **David Kriz**, Ph.D. candidates, Department of Chemistry

"Brain in Jar" depicts a sample of copper-doped mesoporous manganese oxide synthesized by inverse micelle soft-templated techniques. The students captured the material's porous networks in the "brain" image with a Zeiss DSM 982 Gemini field emission scanning electron microscope with a Schottky emitter at an accelerating voltage of 2.0 kV and a beam current of 1.0 mA. The bell jar was photographed using a digital SLR camera and the composite image created using GIMP and Adobe Lightroom.

Second place:
Yang Guo, Ph.D. candidate, Polymer Program, Institute of Materials Science

Inkjet printing is an additive manufacturing method providing high-speed versatility in materials with the capability of creating complex structures. However, most functional materials are non-Newtonian fluids whose behavior is complicated at the operating frequency. Here, Guo correlated jetting behavior with liquid properties to understand the fundamentals of inkjet printing and develop empirical models for complex fluids. The image captures a liquid jet traveling at 1 m/s using stroboscopy, which allows high temporal and spatial resolution without expensive high-speed cameras.

Third place:
Paiyz E. Mikael, Ph.D. candidate, Materials Science and Engineering, Institute for Regenerative Engineering

Mikael's image represents a composite scaffold designed for load-bearing bone tissue regeneration. Each microsphere is composed of poly(85% lactic-co-/15% glycolic)acid (PLGA) and functionalized multiwall carbon nanotubes thermally sintered into 3-D matrices. Multiwall carbon nanotubes improve mechanical properties of PLGA scaffolds and contribute to calcium-ion nucleation and growth.

UConn chapter of Keramos

President: Sapna Gupta	Secretary: Alan Harris
Vice president: Austin McDannald	Herald: Chen Jiang
Treasurer: Nasser Khakpash	Chapter advisor: Prabhakar Singh

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Fourth Event: Pottery Session (Play with Clay)

In March 2015 a group of Keramos members met at a local pottery store for an evening of fun making some pottery. We learned how to make slab-built pottery mugs. We rolled out clay, scored it, and slipped it to create our mugs. The mugs were then bisque fired to transform the clay into ceramic mugs. It was a great team building activity that brought our chapter together outside of our usual academic activities.

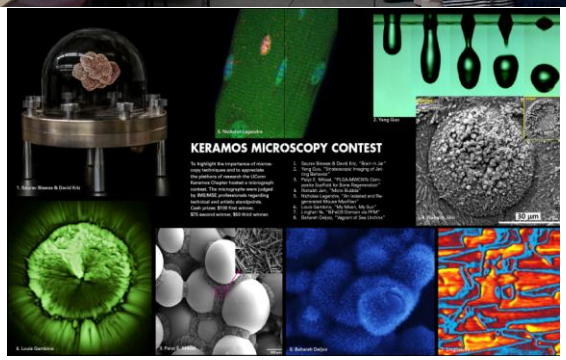
Below mentioned are some images of the event:

Summary

In the second year of our chapter we are finding our stride and continuing to grow in membership. This year we added three new members. We are still working on increasing membership and our goal for next year is to extend into the undergraduate community.

This year we lead several academic and non-academic events with great success. In the summer, before the school year began, we held an ice cream social to recognize the hard work and contributions of IMS student in the course of the previous year. In the fall we also held a micrograph content that yielded many impressive submissions. We rounded the year off by holding a "play with clay event" where Keramos members got together in a non-academic setting to make ceramic mugs. We hope to continue with similar event in the next year of Keramos.

MSE Grads – Play with Clay Event 2015



MSE/IMS – Micrograph Contest 2014-2015