



The Pennsylvania Chapter of Keramos

Annual Report
April 2017

I. Chapter Advisor Executive Summary

PENNSSTATE



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University Park, PA 16802

April 13, 2017

National Keramos Officers:

It has been my pleasure to advise The Pennsylvania Chapter of Keramos during the academic year 2016-2017. Over the past year the Penn State Keramos chapter has made great strides in maintaining the organization's prowess as a student professional development organization at Penn State.

We began the year with what has become a new tradition, Keramos Industry Tour. We took 20 students, by coach, on a 3 day trip to GE Aviation, Nexceris, and NovaChemicals. The trip took place the week before the start of the fall semester. The chapter took 14 students to MS&T in Salt Lake City in the fall. We had an Honorary Inductee in the spring, Dr. Maureen Mulvihill, from Actuated Medical, in Bellefonte, PA, where she is co-founder and CEO. Dr. Mulvihill holds all her degrees from the Department of Materials Science and Engineering at Penn State. Penn State Keramos raised over \$1600.00 in their annual glass flower sale during valentines' season; a new record. For the third year in a row, Keramos sponsored the 492W white paper presentation reception. MATSE 492W is a competition course in which students propose ideas to solve one of the 14 Grand Challenges set forth by the National Academy of Engineering. The white paper presentations are given to an external board of investors. Once all the teams have presented, the Keramos reception provides an opportunity for immediate exchange of ideas and feedback, plus networking opportunities. Of course we continue to successfully execute our speaker series of faculty and industry leaders. Finally, we participated in inter-chapter communications with Alfred University, the New York Keramos chapter. We had planned a visit for the NY chapter at Penn State, but unfortunately, the timing did not work out. We are already looking forward to building on our successes next year and will hopefully solidify a meeting between the NY and PA chapters.

In closing, I hold the achievement of the past year of The Pennsylvania Chapter of Keramos in highest regard. The new officers for 2017-2018 feature 4 rising seniors and a rising junior. I look forward to working with the new officers in the coming year.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert Allen Kimel". The signature is stylized and cursive, written over a white background.

II. Annual Plan for the Upcoming Year

2016 was a success filled year for the Penn State Chapter of Keramos. Coming off a diamond award, and the Outstanding Chapter Award definitely sets our expectations high for 2017. In the upcoming year, our main goal is to increase membership, while maintaining our commitment to professional development and alumni relations.

Some ways we hope to increase membership is to have our officers visit freshmen and sophomore year materials science classes and advertise. We will also make a point to hand deliver the invitations in hopes the personal touch increases the likelihood that students will join. If we are successful in increasing membership, not only will our annual events run smoother, but doors will open for us in planning new events.

There are a select number of events that we have found success with, and will continue to organize for next year. These include but aren't limited too our glass blowing sessions, the student faculty luncheons, blue and white tailgate, and our partnership with MA in hosting faculty, and industry speakers.

As far as new plans go, we hope to improve inter-chapter relations by hosting the Alfred University chapter for a weekend and have them tour our facilities. We also hope to further strengthen the bonds between student, faculty, and alumni by organizing more outdoor events. Hopefully increased membership will allow us to bring back the once successful duffers golf outing. Other possible events include nature hikes, and attending spring baseball games.

One area where we've fallen short in previous years is the mug drop and disc golf competitions at MS&T. To ensure that we actually have an entry for next year, we will get the ball rolling during the first week of classes by selecting a team and a faculty advisor to plan out the design and start making the ceramics before the semester gets too busy.

Despite achieving recent success, we know that the Penn State chapter of Keramos can always be improved, and we believe that our goals for the upcoming year are achievable. We recognize the great benefits this organization can have on young students in terms of professional development, so we hope to increase the number of sophomore inductees as it will have a positive impact on both them, and the organization.

III. List of Officers

2015-2016 Academic Year

President

Jacob Cordell 237

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Vice President

Henry Trabue

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Treasurer

Elizabeth Ancin

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Secretary

Catherine Pomorski 8303

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Herald

Jacob Griffith

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

2015-2016 Academic Year

President

Henry Trabue

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Vice President

Jacob Griffith

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Treasurer

Brett Diehl

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Secretary

Elizabeth Ancin

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Herald

Naveed Stegamat

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Delegates for 2017 Annual Meeting

Henry Trabue and Jacob Griffith

Alternate Delegates for 2016 Annual Meeting

Brett Diehl, Liz Ancin, and Naveed Stegamat

IV. List of Active Members

2015-2016 Inductees

Timothy Smith*
Brett Diehl*
Margot Dormer*
Andrew Schwartz*
Stephen Holoviak*
Evan Merica*
Nick Clark**
Howard Payne**
Naveed Stegamat**

*inducted 10/3/16

**inducted 2/13/17

Undergraduate Members

Elizabeth Ancin
Nicholas Bonsignore
Victoria Christensen
Isabelle Gordon
Jacob Griffith
Courtney Mensch
Divyesh Patel
Catherine Pomorski
Aaron Selnick
Henry Trabue
Luke Yost
Timothy Smith
Brett Diehl
Margot Dormer
Andrew Schwartz
Stephen Holoviak
Nick Clark
Howard Payne
Naveed Stegamat

Graduating Members

Jacob Cordell
Emily Fucinato
Sarah Newby
Nicole Kirchner
Seth Kreider
Rachel Sherbondy
Rafael Vila
Evan Merica

Graduating Members Emails

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Graduate Members

Jason Lapano
Frederick Lia
Arkapol Saengdeejing
Stephen Weitzner
Beecher Watson
Yihuang Xiong
Nicholas Simonson
Rebecca Walton
Jarrett Rice
Sven Alagic
Michael Brova
Nathan Kistler
Xiaotian Zhang

Faculty Members

James Adair
Susan Trolier-McKinstry
Karl Spear
David Shelleman
Carlo Pantano
Clive Randall
Paul Painter
Suzanne Mohny
Gary Messing
Zi-Kui Liu
R. Allen Kimel
John Hellmann
Venkatraman Gopalan
Long-Qing Chen
Paul Brown
James Runt
David Babb

V. Honorary Member Biography

Dr. Mulvihill has set new standards for medical technology using piezoelectrics; her outstanding contribution in the field of ceramic engineering highly qualifies her for this honor. In 1996 Maureen earned her Ph.D. from Penn State in Materials, with a focus in piezoelectric actuator and transducer applications. Prior to leading Actuated Medical in her current position, she worked at several small technology firms developing and commercializing piezoelectric motors, adaptive optics and medical devices.

Maureen has been recognized internationally as an Alexander von Humboldt Fellow at the Max-Planck-Institute für Metallforschung in Stuttgart, Germany. In this position from 1997-1998, she worked in the electron microscopy group with Prof. Manfred Ruhle specializing in Orientation Imaging Microscopy. Maureen moved on to become a staff scientist at Xinetics, Inc, where her team developed a cryogenic deformable mirror using piezoelectric actuators for NASA programs such as the James Webb Space Telescope and Terrestrial Planet Finder (TPF). In October 2002, she received a NASA Technology Innovation Recognition award for “Low Temperature Deformable Mirror Technology” (MFS-31634-1). Moving up in her career, Maureen served as Director of Research and Development at Micromechatronics, Inc. from 2004 to 2007. At Micromechatronics, Maureen directed research and efforts to commercialize piezoelectric devices for DoD applications and wrote SBIR proposals in the area of ultrasonic motors, piezoelectric transformers, and actuator materials to build the research and development group and expand the business base. She is also a Co-Inventor on the Solid State Gimbal System Patent No. 8,043,229. From this position, Maureen then moved on to create her own medical technology company, realizing the need for micro-actuators in medical technology based on discussion with doctors.



Dr. Maureen Mulvihill,
Actuated Medical

Maureen co-founded [Actuated Medical](#) in 2006 with a vision to integrate piezoelectric and other controlled actuation technologies into medical devices. She is responsible for the company’s corporate vision and maintaining its vibrant culture. In addition, she directs commercialization efforts working closely with clinicians and strategic partners to ensure products are viable in real world settings. Under Maureen’s leadership, Actuated Medical has continually grown in both revenue and staff. She has graduated from the Goldman Sachs 10,000 Small Business Program. She has been recognized as 2015 Entrepreneur of the Year by the Chamber of Business and Industry Centre County Pennsylvania. Twice she has been a Finalist for the Ernst & Young Entrepreneur of the Year® Award for the Western Pennsylvania, and West Virginia region. She has also been recognized by PA Business Central as “One of the Top 100 Business People in Central Pennsylvania” four times. She was recognized as “One of the Top Women Making a Difference in the Central Pennsylvania region” and as an Enterprising Women of the Year Finalist by Enterprising Women Magazine. Actuated Medical has recently been honored at the White House with a 2014 SBA Tibbetts Award for Small Business Innovation Research (SBIR) Excellence.

Maureen’s research and leadership have greatly benefitted ceramic engineering and her continued success has paved the way for new actuation technology and expanded the industry creating both jobs and high-quality medical technology.

VI. Treasurer's Report

For the 2016-17 academic school year, The Pennsylvania Chapter of Keramos raised \$2,052.20. This was accomplished primarily through membership dues and the glass flower sale. Our chapter often does well with the flower sale and felt that it would result in significant revenue this year as well. Due to this success, our officers were very interested in using funds to promote interest in Keramos. The glass flower sale primarily offset the expenses from promoting our chapter through social activities. These social expenses totalled \$451.16. Additional expenses were incurred from traveling to MS&T as well as from paying outstanding dues owed to the national board. The final balance of our Chapter was \$3,266.69, marking a net change of +\$261.04 from the beginning of the year.

Beginning Balance:	\$3,005.65
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Costs

Food for Meetings/Social Expenses	\$451.16
Travel Expenses	\$4,240.38
Outstanding Dues	\$100.00
Total:	\$4791.54

Income

Convocation Travel Reimbursement	\$2,958.38
Dues	\$410.00
PSU Organizational Interest	\$2.20
Glass Flower Sale	\$1,642.20
General Reimbursement	\$40.00
Total:	\$5,052.58

Final Balance:	\$3,266.69
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VII. Chapter Activities

a. Educational Outreach

Exploration U

January 2016

Every year members of Keramos and Materials Advantage team up to go to the local high school to give science demos to elementary and middle school aged kids. This event is offered to all Centre County residents and are held all of the county at both high schools and middle schools. This gives Keramos an ability to show what Materials Science is to children and let them explore the world of science at a young age.

Earth and Mineral Sciences Exploration (EMEX)

March 2017

EMEX or the College of Earth and Mineral Science Exposition is a student run open house devoted to juniors and seniors in high school to give them an opportunity to explore majors in the college of EMS. The Keramos members were tasked with giving tours of the newly renovated Steidle Building as well as the Millennium Science Complex, give demos demonstrating different aspects of materials science as well as explain the major and all of the different opportunities within it.



Discovery Space

December 2016

At the Discovery Space, a local science museum with exhibits targeted at kids ages 3-13, Keramos members took a weekend to present demonstrations to hundreds of children from local schools who came in with their parents to have fun and learn. We were able to convey some of our lessons and expertise with ceramics, metals, and polymers to the kids and were fascinated by which exhibits interested which age groups and eager to teach just as the children were eager to learn and play with the hands-on demos. An experiment exhibiting the differences between crystalline and glassy metals seemed to be one of the most popular attractions of the day. The event allowed Keramos members to volunteer in an area where we could utilize our materials knowledge and boost interest for materials science in pre-K through 8th grade students.

b. Professional Development

Industry Trip

August 2016

Leading into the Fall 2016 semester, our chapter sponsored an industry trip alongside the Penn State Chapter of Materials Advantage to show students first hand what industry careers in their fields look like. The trip took students to GE Aviation in Cincinnati, where they asked questions on jet engine assembly, Nexceris LLC in Columbus to learn about battery and fuel cell processing, and NovaChemicals in Pittsburgh to see polymer synthesis and foaming at work. While also a fun summer trip to get to know fellow students, participants got to experience metals, ceramics, polymer, and electronics work preparing them for jobs in materials science and giving them a better sense of awareness for the life paths they may choose to take after graduation. The trip was open to incoming freshmen through seniors offering a different perspective to each age group.

MS&T

October 2016

Every year Penn State allows students to attend MS&T to meet with other schools, present poster projects, gain more knowledge on research of faculty and student members as well as learn ways to improve the Keramos Chapter. This past



year Penn State Keramos won chapter of the year through their efforts to reach out to neighboring schools, alumni, and professors in order to strengthen relations with other chapters

as well as within our own chapter. We had two Penn State students speak, as well as a few Penn State professors such as Dr. Kupp, Dr. Beese, and Dr. Liu at MS&T, and plan to have many more students and faculty present in the upcoming years.



Dr. Robinson Work/Life Balance Talk

February 2017

In the Spring 2017 semester, Dr. Robinson came in to speak about work/life balance and how much it changes throughout

your life. He spoke about the different paths life will take you whether you plan them or not, and in what ways they will affect your career. He spoke about the differences when entering work in industry compared to furthering your education and focusing your career on research. He highlighted the benefits of both and touched upon the downfalls of each, allowing us to realize what path we felt was most suitable for our lifestyle in order to have a better understanding of the path we would like to take in the near future.

Dr. Zarzar Research Talk

December 2016

Keramos hosted our very own Dr. Zarzar one meeting to come in and talk about her past projects and give career advice. Dr. Zarzar attended The University of Pennsylvania and received a bachelor in Chemistry as well as a bachelor in Economics. She then went on to attend graduate school at Harvard University and received her Ph.D. in Chemistry. She came in and spoke about dynamic materials that sense and adapt to their surroundings, primed to be integral components of future technologies. Such systems often require precise chemo-mechanical coordination between multiple materials working cooperatively in order to achieve the proper functionality. Therefore, in addition to the exploration of novel mechanisms coupling these chemical and mechanical cues, it will also be critical to develop prototyping approaches that facilitate the integration of a myriad of materials, especially at nano and micrometer length scales.

Dr. Hickey Research Talk

November 2016

Dr. Hickey came to speak about his research projects and goals, such as producing and controlling structural colors, nanoscale structures that reflect light of a given color as a result of quantum or interference effects, instead of traditional electronic and optical effects. In addition to opening the minds of new students by explaining novel physical effects, Dr. Hickey invited undergraduates to talk to him after the meeting regarding research opportunities.

Gilson Snowboards

October 2016

During the Fall of 2016, a MatSE fan favorite, Nick Gilson, founder of Gilson snowboards, came to speak for the second time. It was interesting to see the progress that he and his company has made since his talk in 2015. Nick definitely has a great story to tell, from attending John's Hopkins, to teaching middle school science, and then finally achieving his dream of starting his



own snowboard company. He had a lot of good advice, and was able to answer many questions for the students that have dreams of starting their own businesses in the future.

492 W Reception

March 2017

492 W, Materials Engineering Methodology and Design is a class every MatSE student must take in order to graduate. It is the first class that really focuses on creativity and team building in order to prepare students for the working world and learning how to work with others, making deadlines, and working to promote your product. In the middle of the Spring 2017 semester was the first time each team sat in front of industry leaders to pitch their ideas, it was followed by a reception where we would get to talk personally with the industry leaders to network, find out first hand what it was each team did well on and what they needed improvement with when presenting their idea. It was catered with tons of delicious food and people stuck around to talk and network for a few hours.

Student Faculty Luncheon

November 2016/April 2017

Both students and faculty alike look forward to the annual student/faculty luncheon sponsored by Keramos (and it's not just because of the great food!). The Millennium Science Complex's Materials Research Institute hosted the event. Faculty members of Keramos love advising the undergraduate student body on how to shape their futures, and these discussions are best served with lunch from Panera Bread. While most talks involve professional advice, career planning, and academic success, the attending professors keep a light mood by throwing in some casual conversation. Through these student/faculty networking events, students gain valuable insight into becoming the next generation of materials scientists.

Career Services Workshop

January 2017

Our chapter worked toward improving job prospects of materials science students at Penn State by providing a strong connection with career services associated with the College of Engineering, but previously not active in our department in the College of Earth and Mineral Sciences. In coordination with Material Advantage and the Materials Research Society, we organized a career services workshop with an adviser from Career Services to introduce students to a wide variety of resources available for improving resumes, finding internships and jobs and progressing in the field through networking. In this new partnership with career services, we also set ground work to have materials science student liaisons with Career Services. These liaisons who are students with internship and job experience serve as a resource to their peers for advice and feedback on how to capitalize on job opportunities. Through this new position, students can grow their network and make use of their peers' networks and experiences to become more involved in the materials engineering community.

c. **Service to the Ceramics Community**

Glass Flower Sale

November 2016 - February 2017

This year, our chapter was able to organize the glass flower sale, which was unable to be held last year. Chapter members were trained to work with the glass and were then able to form the floral shapes to their preference. Dr. Carlo Pantano graciously allowed our members to use his glass lab to make the flowers. Dr. Pantano and a couple students from his group supervised the training and the flower-making process. In our process, molten glass was set onto colored ceramic particles, reheated, and then pulled to create the petal and stem shape.

The main purpose of this sale was to provide flowers for students and faculty to purchase for Valentine's Day. These flowers were very popular due to their longevity in comparison to real flowers. Additionally, this sale served as fundraiser for our chapter, so that future events like this one could be organized. This year Kermaos was able to raise \$1,500 in glass flower sales. The materials and equipment were donated by Dr. Pantano and his research students were able to teach the members how to pull glass flowers. Not only were we able to learn about glass processing, but we raised money for events and catering throughout the semester.



MBE Demonstration Construction

February-April 2017

This past Spring 2017 semester Dr. Engel-Herbert teamed up with 4 students to begin researching and creating a replica of a molecular beam epitaxy system. The team plans to make a replica a size that can fit on a table in order for individuals to get a full view of it on a smaller scale, and can work with it hands on. The team also plans to make it simple enough for kids to understand how it works while incorporating food for the material layers to make it a fun machine to experiment with and learn on.

Nittany Greyhounds

December 2016 / February 2017

In the Fall 2016 semester, the Penn State Chapters of Keramos and Materials Advantage teamed up to assist the staff at Nittany Greyhounds, a local dog shelter. Members aided in maintaining the shelter and in interacting with the dogs it housed. Participants were also given background stories about each dog in the shelter. Some club members washed food bowls and tidied up the cages, while others had the opportunity to take the dogs on walks and play with them. These dogs were largely retired racing greyhounds, so their energy was high, which served to lift the spirits of the members of Keramos who they met.



d) Alumni Engagement

MS&T Student Alumni Reception

October 2015

Back in October, Penn State brought over 30 undergraduate students to MS&T, many of whom were Keramos members. Penn State's stay at the conference culminated in an alumni reception, held in the same hotel as the Keramos functions, where dozens of students, professors, speakers,

visitors, and recent graduates came together. The dean of Materials Science and Engineering at Penn State spoke about the past, present, and future of the program, pointing out many of the individuals responsible for the progress and growth it has and will experience.

Blue-White Tailgate

April 2016

On April 22, 2017, all members of the Penn State community including alumni, students, families, and faculty will convene at the annual Blue and White spring football game. This provides a great opportunity for members of Keramos, Materials Advantage, and Materials Research Society to come together for a casual networking event. A tailgate funded by the aforementioned organizations fosters an atmosphere of great food, cold drinks, warm weather, and freedom from the lab. This fun event serves to bring the faculty and alumni closer to the undergraduate and graduate students while strengthening their professional relationships as well.

Steidle Building Dedication

September 2016

In the fall of 2016, the MatSE department hosted a dedication for the newly renovated Steidle building. The event was business casual, and featured a wide variety of catered food options. Students, faculty, and alumni were all present to thank the donors and admire the brand new offices, classrooms, and labs. This event also provided networking opportunities between students and faculty.

e. Participation at the Annual Convocation and Business Meeting

MS&T Convocation

October 2015

The officers of the Keramos chapter at Penn State traveled to Salt Lake City this year. The officers attended the Keramos Convocation early in the morning to mingle with other student chapters and listen and share ideas to other chapters on how to improve the chapter and maintain student involvement. The Executive Board joined to discuss to direction of the Keramos fraternity. After that chapter awards were handed out to each chapter. This event allows for the growth of the Keramos fraternity and ended successfully.

f. Interchapter Communications and Collaboration

Monthly Phone Calls

September 2015 – April 2016

The monthly phone calls are important because they are the only thing that periodically connects all chapters of Keramos. Regrettably, the Penn State chapter was only able to attend a few of the monthly teleconferences due to scheduling conflicts. Because of this we unfortunately were not able to hear monthly chapter updates from the other schools, but we always made sure to email our chapter updates to Devon, the student representative.

Alfred Meeting Planning

January-April 2017

In the Spring, the Penn State Chapter of Keramos corresponded with the Alfred chapter to organize an interchapter meeting. While a date for the Spring semester was difficult to pinpoint with the busy end of semester schedules of both chapters, the start of communication is promising for a meeting of our two chapters in Fall of 2017 and Spring of 2018. While the conversation back and forth did not resolve in an in-person meeting this school year, we were able to connect and discuss the goals of our respective chapters, building upon previous events to grow and develop both chapters in coming years.

Break Stuff Night

April 2016

The Penn State Chapter of Keramos has set April 30th as the official date for Break Stuff Night. The officers of Keramos hold this night right before finals week to give MatSE students an opportunity to release pent up stress that has been accumulated over a long and rigorous semester. The officers will go grocery shopping to buy common household items like apples, bananas, etc. and will dunk these items in liquid nitrogen to freeze them. Students can then smash these frozen objects on the ground to de-stress.

Broomball

April 2017

Broomball, along with break stuff night, are good ways to let off some steam during a hectic semester. Broomball is essentially ice hockey without the skates and pads, and a foam ball is used instead of a puck. Light injuries are usually sustained, but nobody seems to mind as a fun time is had by all.



VIII. Article for Keragram

See final attached page for article.

The Keramos chapter at the Pennsylvania State University worked hard this year to expand involvement tapping graduate student and faculty expertise to deliver more engaging events and give back to the local community as well as the global ceramics community. The Penn State chapter worked to communicate with younger students explaining the duties and rewards of ceramic engineering and providing hands on demonstrations of materials science in high tech applications and everyday life.

Undergraduate students met with graduate students and faculty in research areas of interest in an informal setting over lunch each semester as well as at a tailgate before watching the university football team scrimmage in the spring. Our chapter's honorary inductee this year, Dr. Maureen Mulvihill delivered a career oriented talk on her groundbreaking research on transducers for medical applications and career path leading to her founding a company based on that research.



In the fall and early winter, students learned how to blow glass and match an aesthetic product to client demand, selling glass flowers for Valentine's Day to students and faculty in the college. The Keramos lab workers made hundreds of flowers and we sold our creations to students, faculty, and staff of the university as well as visitors who learned about our craft and mission. Customers of all backgrounds were eager to hear how the flowers were made



especially because the work was done by undergraduates in a campus facility. We continued to raise awareness through events during the semester volunteering to take care of retired racing dogs at Nittany Greyhounds and through demonstrations for elementary through high school students.

Penn State members appreciated the opportunity in October to meet and share ideas with chapters at the Keramos

Convocation in Salt Lake City, Utah and we look forward to converging with fellow chapters closer to home in Pittsburgh this fall.