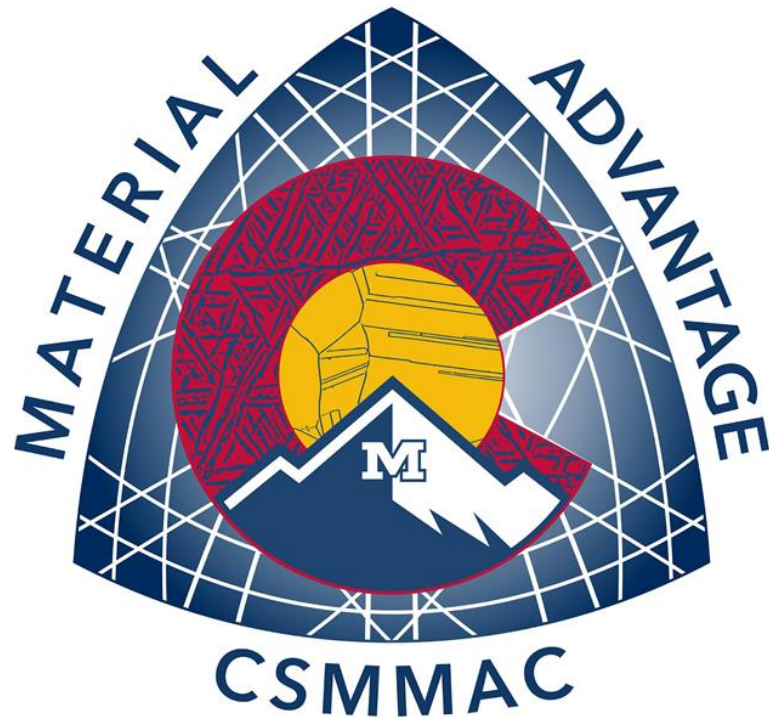




COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT



Chapter of Excellence Application

2018-2019

Colorado School of Mines Material Advantage Chapter
CSMMAC

Submitted to ASM International on June 1st, 2019

Prepared by Stuart Shirley, Chair 2018-2019

Faculty Advisors: Dr. Kip Findley, Dr. Gerald Bourne, Dr. Geoff Brenneka



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EARTH • ENERGY • ENVIRONMENT

*The George S. Ansell Department of Metallurgical and
Materials Engineering*

1500 Illinois Street Golden Colorado 80401-1887

May 8, 2019

To whom it may concern:

We are writing a very positive letter of support on behalf of the Colorado School of Mines Material Advantage Chapter (CSMMAC) for the Chapter of Excellence Program. CSMMAC has been integral to the Metallurgical and Materials Engineering (MME) department and Colorado School of Mines activities for several years. They continued to operate at a high level over this past year through numerous and innovative programming and outreach activities.

CSMMAC has continued its strong outreach programs, both technical and non-technical, to serve the Mines and external communities. CSMMAC plays a critical role in recruiting students for materials engineering through Mines events for prospective and incoming or current freshman students considering different degree paths; the MME department solicits help from CSMMAC particularly with demonstrations and sharing student experiences. Additionally, CSMMAC participated in other campus events including assistance with an event oriented towards suicide awareness on campus, which is an important issue broadly for university campuses. In addition to the continued presence CSMMAC has with local school activities, the chapter engaged with new external outreach events that impacted numerous K-12 students. For example, the chapter developed new hands-on activities for an on-site event with a local middle school; the event was held over 2 days to accommodate all of the 6th grade students who participated. As a demonstration of the historical impact of these chapter activities, the event was led by a student who participated in a similar on-site event as an 8th grader several years ago! Additionally, CSMMAC led and collaborated on other events, including with the local Keramos chapter.

The executive committee organized novel programming opportunities for the chapter members this year. For example, they invited guest speakers to present to the chapter through a video conference format, enabling student access to materials leaders that would have otherwise been difficult to arrange. These teleconferences went smoothly and had strong student engagement and thus, the chapter plans to continue this activity in the future. The other speakers represented diverse fields and opportunities including technical ceramics, aerospace, steel, extractive metallurgy, forging, and national laboratories. CSMMAC also attempted new ways to provide value to its members through hands-on workshops, utilizing the creative opportunities available at Mines including the glass shop, forge shop, and foundry. Additionally, the chapter continued to show strong participation the various competitions and activities sponsored by ACerS, AIST, ASM, and TMS. One highlight this year was winning the Materials Bowl at TMS 2019! The group is also actively involved with the local ASM Rocky Mountain

Chapter and again organized the annual Barrett Award Lecture, delivered this year by Dr. Jeffrey Wadsworth.

The Material Advantage program provides an excellent opportunity for leadership development. The group of officers this year was particularly effective in their chapter management, leadership, and organization. The breadth and level of new activity generated by this group is unparalleled in most of the previous years of the chapter. They also established a vision for growth opportunities before transitioning to the new officers. In doing so, they made the transition more seamless by having more organized knowledge management practices to document the roles and experiences from the previous year for each incoming position.

The MME department considers CSMMAC to be core to its activities and continues to utilize CSMMAC for input on our curriculum and courses as well as evaluation of teaching assistants and faculty for awards. The department is undergoing a curriculum revision where we will now have MME courses starting in the fall semester of the sophomore year. As many of our students have entered the program after discovering it later in their undergraduate careers, we anticipate that CSMMAC will play a critical role in recruiting and welcoming new students as incoming sophomores. We are extremely fortunate that we can tell incoming students that they have the opportunity to get involved in a chapter annually considered amongst the best in the world. This year is no exception! We are very proud of this group! Please let us know if you have any further questions.

Sincerely,


CSMMAC Co-Advisors



Jerry Bourne



Geoff Brenneka



Kip Findley

Chapter Overview

The past 2018-2019 school year has been a busy year for Colorado School of Mines Material Advantage Chapter (CSMMAC). CSMMAC sent 19 students to MS&T and TMS conferences this year to participate in the student competitions, network, and attend technical lectures. At this conference members of CSMMAC placed in several competitions including the aesthetic mug, Materials Bowl, and the Bladesmithing competition. At MS&T CSMMAC also accepted the most outstanding chapter award.

As part of the executive team continuous approach for chapter improvement this year a focus was placed on diversifying meeting content to appeal to a larger portion of the Metallurgy and Materials student body here on campus. To achieve this, three main changes were made to general CSMMAC meetings. Those changes included hands on workshops, video conference lectures, and industry speakers from student interest areas. The hands on workshops proved to attract students that did not regularly attend technical lectures, this has been a good route for CSMMAC to build community and reach a wider audience within the Metallurgy and Materials Department (MME) and across campus. The video conference lectures were a first for CSMMAC and allowed the chapter to have technical lectures from notable speakers and textbook authors that were out of state.

2018-2019 Officers



Stuart Shirley, Chair



Taj Mitchell, Vice Chair



Monica Carreta, Treasurer



Kelsey Cannon, Secretary



Brionna Dumlao, Outreach Chair



Grace Rome, Outreach Chair



Nyomi Martinez, Outreach Chair



Karsten Anderson, Social Chair



Walker Hayse, Social Chair



Victoria Avance, Senior Class Rep



ChuFu Xiong, Junior Class Rep

Programming

CSMMAC holds weekly meetings to introduce various subjects to our members. Academic and industry speakers share their career path, current work, and advice during evening presentations. Speakers cover a wide range of topics, but all relate to the students and provide insight into possible paths students can take upon graduation.

Some of our speakers were unable to travel to Colorado School of Mines, so we used Zoom, a video conferencing software to allow them to speak from their office or home. This has been a valuable addition to CSMMAC because it allows the busier, more influential and famous speakers to speak to our chapter.

CSMMAC has introduced a new avenue of meetings through hands-on workshops to appeal to more undergraduate and graduate students. We put together time slots for students to work in the glass shop, forge and foundry. This provides the students opportunities to learn by action rather than learn through a lecture.

Academia Speakers

Colorado School of Mines, Dr. Gerald Bourne

Dr. Bourne, the assistant department head and physical metallurgy lab supervisor, attended the first meeting of the fall semester. He welcomed the students back to school and briefly discussed the department. His presentation focused on his research on metallic glass where he provided in situ micrographs of his results.

Colorado School of Mines, Dr. Emmanuel De Moor

Dr. De Moor, a professor specialized within steel and a member of the ASPPRC, presented about his childhood growing up in Ghent, Belgium, the difference in European education from the United States, and his progression throughout his professional career.

Georgia Institute of Technology, Dr. Naresh Thadhani

Dr. Thadhani, department head and researcher within the Materials Science and Engineering department at Georgia Tech, presented his research on high impact testing that could be used for armoring of military vehicles and protection from debris for spacecrafts. Dr. Thadhani was our first speaker that used the video conferencing software Zoom and the first run was successful.

Colorado School of Mines, Dr. George Krauss

Dr. Krauss, an emeritus professor, one of the founders of the ASPPRC and author of several steel textbooks, spoke about the history of steel, the progression of his steel

textbooks and the struggles that he faced with promoting and sustaining the ASPPRC during a time where investment in research was not pervasive.

Colorado School of Mines, Dr. David Matlock

Dr. Matlock, an emeritus professor and one of the founders of the ASPPRC, spoke about his career within steel, his role within the ASPPRC and advice for the students. He also brought in a piece of a ski chair lift that fractured during operation and talked about the process of failure analysis.

University of California Riverside, Dr. Reza Abbaschian

Dr. Abbaschian, a distinguished professor, director of Winston Chung Global Energy Center at UCR and an author of Metallurgy Principles textbook used in our microstructure development course, presented on his research about diamonds and graphene. His research has led to the introduction of man-made diamonds to the market by Gemesis Diamond Company. His presentation showcased the process of artificially manufacturing diamonds using graphite and high pressure and temperature tungsten carbide capsules. This presentation was successfully conducted using Zoom.

Industry Speakers

Nucor Steel, Eric Gallo

Eric Gallo, the technical services manager at Nucor presented about the recent ethical dilemmas that companies such as Volkswagen were facing. He talked about how Nucor has significantly focused on ethics and developing a culture to avoid scandals within their company by implementing certain procedures and processes that promote honest and ethical decision making.

Ellwood Group, Marie Russo and Kyle Froetschel

Marie Russo and Kyle Froetschel presented about Ellwood group during the week of Career Fair. Kyle spoke about their machines and equipment that produce some of the largest crankshafts in the world. Marie spoke about the internship opportunities during the summer as well.

Blount International, Dr. Mark Taylor

Dr. Mark Taylor, an engineer in the metallurgical laboratory at the headquarters of Blount International and CSM alumnus, gave a presentation to CSMMAC about the role of a metallurgical laboratory for a global manufacturing company. He gave an introduction to the design and metallurgy of various saw chains. Blount International recruits metallurgical engineers and interns from CSM extensively, and they are a member of the ASPPRC, making this a unique networking opportunity for CSMMAC members.

Coorstek, Anthony Linenberger

Anthony Linenberger, a Mines alum and engineer at the Coorstek facility in Grand Junction, CO, gave a presentation about tape casting ceramics and its application for body armor. He also spoke about his transition from academia into the workforce and some tips for success when starting your first job.

Newmont Mining Corporation, Zach Zanetell

Zach Zantell, a senior metallurgist at Newmont and CSM alum, gave a presentation on the role of a metallurgical and materials engineer in the mining industry. He provided an overview of the company and of career opportunities with Newmont. He also discussed his current work at Newmont's global R&D facility, the Malozemoff Technical Facility.

Los Alamos National Labs, Paul Gibbs and Samantha Kay Lawrence

Paul Gibbs and Samantha Kay Lawrence, alumni of Colorado School of Mines and current researchers and Materials engineers at Los Alamos National Labs, spoke about specialized projects within additively manufactured steel parts, crack propagation and cold-rolling an uranium alloy. Aside from their highly-technological projects, Samantha and Paul shared their path from school to the workforce.

United Launch Alliance, Andrea Lehnhoff

Andrea Lehnhoff, alumni of Colorado School of Mines and systems engineer, spoke on the behalf of United Launch Alliance. She discussed her path from materials engineering to systems engineering, but discussed the development and breakdown of materials within the spacecraft constructed by United Launch Alliance. Andrea also provided insight into ULA's internship program and the BIRST program where students build and launch their own rocket.

Lockheed Martin, Scott Cochran

Scott Cochran, alumni of Colorado School of Mines and senior materials engineer at Lockheed Martin, presented about composites within aerospace, his career path and advice for the students of CSMMAC. Scott brought in sample pieces of composites that were tested for specialized projects. He further discussed how his role at Lockheed is moreso an engineer, rather than a materials engineer because he is solving different problems everyday.

Other Meeting Events

Internship Panel:

During the fall semester career week an internship panel was held with six members of CSMMAC fielding questions from the audience discussing their summer internship experience. The forum was run by faculty adviser Dr. Bourne, who prepared several questions to start the event and then opened it to the audience. The students on the internship panel represented career internship areas of steel production, forging, aerospace, ceramics, private government contract, and oil and natural gas consulting. This panel discussion was well received by the membership as preparation for career day.



Forging and Glass Shop

Each semester in the forging workshops, students signed up for a time slot to make a coat hook where teaching assistants from the forge instructed and supervised 16 students over two hours to gain some forging and forming experience. The glass shop was the same process, but students instead made glass paperweights. Students were able to choose the colors and form the glass on their own with teaching assistant supervision, twelve students attended the hands on glass workshops.

Career Development

One of the primary roles of CSMMAC is to provide professional development opportunities to students outside of the classroom. This year students were very active at the conference competitions.

Industrial Tours

AMG Vanadium: During the MS&T 18 conference a tour of AMG vanadium was coordinated with Mines Alumni Tyrel Jacobsen. Students traveled to the AMG facility outside Columbus where they toured the roaster and refining facilities that AMG uses to recover vanadium from recycled products. The evening before the tour AMG hosted a dinner for nine CSMMAC members, and several faculty and graduate students. The tour and dinner were wonderful networking opportunities for students with a company sponsor of the steel research center here at mines.



ACerS Tour:

Five members attended the ACerS tour at MS&T last October which took place at the Owens Corning Science and Technology campus in Granville, Ohio. There the students were introduced to the testing processes utilized by Owens Corning to evaluate their glass, fiber composites, insulation and roofing materials. Students also learned about opportunities for internships regarding materials development at Owens Corning. The tour was a great opportunity to learn more about research processes and the day to day workings of a research facility.

Technical Meetings

MS&T '18: CSMMAC sent nine members to Columbus to network with students, professors, and industry representatives, and to attend a variety of short courses and lectures. Students also competed in the mug drop competition and student poster contest. Chair Stuart Shirley and Vice Chair Taj Mitchell attended the Chapter officer workshop. This workshop was a great networking opportunity with other MA chapters, big takeaways from this meeting were more hands on workshops, event flyers for each month, and hosting more social events. Two students in attendance received scholarships, the ASM George A. Roberts Scholarship, and the AIST Willy

Korf memorial Scholarship. Pictured below is the Colorado School of Mines contingent accepting the Most Outstanding Chapter Award.



TMS 2019: Ten students traveled to TMS in San Antonio. While there, students attended research lectures, networking events, and competed in the Materials Bowl. Students took advantage of opportunities to make connections with the presenters after lectures, to find out more about research programs and internship positions. The materials bowl team won first place, making the chapter record 7 of 13 competitions. Each year attending the materials bowl competition is a highlight of the trip for students and faculty to cheer on the Mines team. The bladesmithing team won second place with the raindrop pattern damascus chef knife. The bladesmithing competition is a rewarding project, and inspired a bladesmithing class at Colorado School of Mines. Overall, the conference was successful in connecting students with professionals in their field, as well as inspiring them to learn more about metallurgical and materials engineering.

Congressional Visit Days: CSMMAC was able to fund the attendance of five student members to the 2019 Material Advantage Congressional Visits Day in Washington DC. The students were able to meet with the offices' of Colorado Senators Michael Bennet and Cory Gardner and the offices' of Colorado Congressional Representatives Ed Perlmutter, Ken Buck, and Joseph Neguse to advocate for and educate legislators and congressional staff about the importance of research in materials science and engineering and the need to increase federal R&D funding. During these visits, students shared personal stories about how federal funding has improved their education and careers in STEM and informed legislators and staffers of upcoming bills that will have a positive impact on the STEM community. A professional development event organized by Material Advantage and American

Association for the Advancement of Science fellowship program also gave students the opportunity learn about the congressional appropriations process and its effect on STEM as well as opportunities for scientists and engineers to become involved in policy and advocacy. Students were also able to take advantage of the cultural and historical richness of Washington DC with visits to the National Monuments, the Smithsonian Natural History and Air and Space Museums, and the 2019 National Cherry Blossom Festival.



Student Competitions

Mug Drop Competition: Bobby Puerling and Jake Ivy spearheaded the ceramic mug for the visual aesthetic category. They blew a handled glass mug in the Materials department glass shop. This mug won first place, in the next year we hope to compete in the drop category and aesthetic category with greater student interest expressed after the last MS&T conference.

Materials Bowl: While at TMS 2019, the Mines Materials bowl team, comprised primarily of CSMMAC members, won the Materials Bowl. The team, consisting of graduate students John Copley, Melissa Thrun and undergraduate students Victoria Avance and Collin Gilgenbach, studied together and with faculty prior to the competition. The semi final round against the Florida Gators was a tough competition, with a final score of 20 to 24 Mines. With this win, the team from Mines has now won seven of the thirteen Materials Bowl competitions.



TMS Bladesmithing

This year was a competition submission year for the 2019 TMS conference, and the CSMMAC team took second place, and the only school to place each year of the competition. The bladesmithing team focused on producing a welded damascus pattern chef knife. All the work of the chef knife was completed by the student team



comprised of Metallurgy and Mechanical engineering students. The bladesmithing team continued to conduct hands on forging workshops including an axe making workshop. Starting late fall of 2018 forging workshops are now hosted in the forging space on campus that is part of the Metallurgy and Materials hot shop.

ASM Rocky Mountain Chapter

CSMMAC is an active part of the ASM Rocky Mountain Chapter. Two students held positions on the executive board this year and provided insight on student activities to improve students' meeting attendance. Stuart Shirley served as the student representative to the ASM chapter as part of his duties as CSMMAC Chair, and Connor Rietma continued for another year as the communications chair, responsible for the creation and distribution of the chapter's monthly newsletters.

Barrett Award Night: The ASM Rocky Mountain Chapter of holds an award ceremony annually to honor outstanding contributions to the field of material science. This year, Dr. Jeffrey Wadsworth, President and CEO of Battelle Memorial Institute, was presented the award. After receiving the award Dr. Wadsworth presented on his early research into true damascus steel, historic metal mysteries and carbon dating, and lastly his career path and how students can capitalize on career opportunities.

ASM Meeting Attendance: Faculty, graduate and undergraduate students attended the monthly ASM meetings. Students are encouraged to attend by the chapter's generous dinner subsidies which add a social element to the night's technical talk. Highlight events were the trivia night held in February, the materials bowl team attended as a practice for the materials bowl competition. Mr. David Burnett also provided an interesting lecture on Wood as an Engineering Material.

Service

This year CSMMAC participated in an abundance of outreach activities, volunteering over 195 hours as a chapter. Through the events that were hosted, students interfaced with the community and generate interest in STEM, material science, and metallurgy.

Campus Activities

Celebration of Mines - 8/24/18:

A beginning of the school year event, showcasing and celebrating the numerous organizations and clubs at Colorado School of Mines. CSMMAC continually has a booth at this event, showcasing what Metallurgical and Materials Engineering is as a major. Our club also educates students and community members about our organization, demonstrates several applications/examples of Materials Engineering, and talks about career prospects and personal experiences/internships at the event. For students interested in MME or CSMMAC, an email sign up is also collected at this event for future communications throughout the semester.



Preview Mines - 10/20/18:

Prospective Mines students, normally in the latter years of high school, come to Mines campus to see first hand the CSM campus and find out more about potential majors at the school. CSMMAC always assists the MME department with this event, providing volunteers for department tours and answering student and family questions about Mines and college life in general. This is also another great way to raise awareness of what Materials Engineering is and also to give back to the school for its continued support of CSMMAC.

National Service Week 11/7/18:

This school wide event was dedicated to raising suicide awareness on campus. Members of CSMMAC volunteered to help staff a table where brochures, ribbons, and information on suicide awareness was spread to students. CSMMAC wanted to help the student community on campus by supporting this event.



Discover Mines - 3/14/19:

Similar to the previously discussed Preview Mines, here accepted Mines students are given tours and demonstrations of campus and department buildings. CSMMAC members again act as tour guides answering any questions students or families may have while also showcasing the MME department and CSMMAC.

K-12 Outreach

Mitchell Elementary Math and Science Night - 10/3/18:

Mitchell Elementary annually puts on an evening focused around math and science for elementary students and their families. CSMMAC this year volunteered at the event to showcase basic examples of Materials Engineering and also raise awareness of CSMMAC among the community, along with educating the future generations of engineers about what engineering can do for the world.



Shelton Elementary School Math and Science Night - 10/18/18:

Much like Mitchell Elementary, Shelton Elementary also annually puts on an evening focused around math and science for elementary students and their families. CSMMAC volunteered at the event to showcase basic examples of Materials Engineering and also raise awareness of CSMMAC among the community, along with educating the future generations of engineers about what engineering can do for the world.

Field Trip for 6th Graders - 11/2/18 and 11/9/18:

Sixth grade students from Renaissance ELOB School wanted to learn more about what it means to be a scientist, so CSMMAC planned a day full of hands-on activities for the students. The sixth graders came to the Mines campus for the event. The kids participated in a Charpy and tensile experiment where they learned about different materials and hypothesized how the materials would perform in the tests. The students were also able to pour their own pewter keychain to take home. Another activity the students participated in was a variety of different material science demonstrations such as tempering steel and a short corrosion experiment. Finally, the students visited one of our ceramics labs and saw the scanning electron microscope. This event was a great way to teach young students about Materials Engineering and STEM in hopes that we could help inspire the next generation of engineers.



Career Expo - 11/13/18



CSMMAC members were eager to help with Keramos with the 8th grade career expo. Throughout the day, more than 5,000 8th grade students attended the expo and members showed them metallurgical and materials demonstrations as well as answered their questions about what it is like to be an engineering student at Mines. This event was very successful, many students showed interest in Mines and asked for advice on how to get accepted to the school. Members also helped Keramos promote a classroom science kit that encourages teachers to incorporate materials science into their curriculum.

Prospective Student Tours of Hill Hall - 11/17/18:

High school seniors considering several majors at Mines had an opportunity to visit Hill Hall, the MME department building. During these tours, professors and students conducted demos, fielded questions posed by incoming students, and conducted tours around the building including stops at the foundry and research labs.

Girls Lead the Way - 11/20/18:

A campus wide outreach event, inviting female high school students from across the Colorado area to explore STEM engineering careers at Mines. CSMMAC gave a tour and completed demonstrations for students interested in the MME department, along with answering questions about Mines and college life in general.

Material Science and Engineering Day - 4/25/19:

CSMMAC members volunteered for Materials Science and Engineering (MS&E) Day. This event consisted of bringing 100 sixth grade students from Prairie Middle School to the Mines campus, where they got hands on experiences in the MME labs as well as tours of the campus. Members were each responsible for taking a group of 14 students to all of the stations around campus. The stations included multiple demonstrations where the students got to learn about additive manufacturing, virtual reality, and glass blowing. There were also hands on stations where the students got to cast their own keychains and use virtual reality glasses to see the microstructure of a material in three dimensions. The middle school students that the members worked with wouldn't typically get to attend events that promote STEM to younger generations. CSMMAC members were able to introduce the kids to STEM and more specifically, metallurgical and material engineering for the first time.

Mentorship Program

In the fall of 2018, the "Chat with MME" program partnered upperclassmen with underclassmen either in or interested in the Metallurgical and Materials Engineering (MME) program at Mines. Upperclassmen provided insight and recommendations about classes, professors, and anything related to MME. This program was developed by the outreach chairs in the 2017/18 executive board and was continued this year due to positive feedback from mentees.

Social Activities

Students had a chance to destress from school and homework during the semester by attending one of the many events put on by the social chairs.

Dead Day Breakfasts:

To decrease the stress of finals testing, CSMMAC will continue the tradition of spoiling the students of the MME department with a hearty buffet of breakfast burritos, coffee, and orange juice.

Fall Pumpkin Chunkin:

The weekend following Halloween CSMMAC members participated in pumpkin chunkin using the trebuchet that would compete in the spring E-days competition. The pumpkins that were thrown were carved at the Keramos social carving event, Keramos is another materials member organization in the MME department that often partners with CSMMAC on social and outreach events. At this event students tried to hit a scarecrow with the pumpkins and had a great team building opportunity to learn how to launch the trebuchet with accuracy and precision.



Fall Barbeque:

At the beginning of the fall semester, CSMMAC held a barbeque for the campus to promote CSMMAC on campus. Officers were there to answer questions about CSMMAC and to explain the benefits of joining the society. The event facilitated bonding amongst students both inside and outside of the department. About 42 students were served burgers, hotdogs, and vegetarian options.

Trebuchet Competition:

Each spring Colorado School of Mines hosts a trebuchet competition during the annual E-days spring celebration. This year CSMMAC competed against other club teams and Mines alumni to launch milk jugs with student-built trebuchets. The competition was based on accurately hitting a target at a variety of set target distances. The CSMMAC team took first place in the competition, winning bragging rights for the remainder of the year. Student participants and the trebuchet are pictured at the right with other competing trebuchets in the background.



Spring Party:

This year's spring party to celebrate the graduating seniors was held at Sherpa House in Golden. A buffet was provided by the restaurant for all attendees while they socialized with their fellow graduating MME students, non-graduating students, and professors. Post dinner a small ceremony was held where departmental awards were presented by Assistant Department Head Gerald Bourne to students with high academic achievement and involvement in the department. Keramos and Alpha Sigma Mu also recognized new inductees into their honor societies during this dinner.



Soda-Lime Silicate Glass blowing workshop:

Working together with Keramos, students made their own paperweight with customizable colors and details. They were able to take these home the following day after the glass was tempered. It was a great opportunity for students to get hands on experience for the first time with molten glass and learn more about the new glass shop. This event was held in the fall and the spring in an effort to expand hands on social opportunities for students as part of the CSMMAC offering of

activities. Pictured below is two CSMMAC members learning the techniques to shape a paper weight from trained glass shop gaffers.



Etiquette Dinner:

Keramos organized an etiquette dinner which provided some helpful pointers for how to behave in interviews and similarly formal settings in a relaxed and entertaining atmosphere. CSMMAC, Keramos, and MME members who attended were served five courses of formally-presented fast food accompanied by guidelines and examples of how to (and how not to) conduct oneself.

Chapter Management

The unique events that were put on by this year's executive board would not have been possible if not for the organizational structure in place. Throughout the year, the CSMMAC board communicated effectively to ensure things ran smoothly.

Recruitment Efforts

The traditional recruitment activities for CSMMAC include; Celebration of Mines, Fall Barbeque, and preview Mines discussed previously. In addition to these events, this year a large focus of the executive board was to increase attendance and participation in meetings and CSMMAC events. At the beginning of the year student feedback indicated that a greater variety of events was needed to appeal to a wider spectrum of students. To meet this request, monthly hands on workshops were added to the traditional line up of technical lectures. Additionally, the Vice Chair Taj Mitchell made a large effort to have new technical speakers from a broad range of industry.

Bylaws Overview

Bylaw Revisions: The meeting to review bylaws and suggest changes is an important meeting that keeps CSMMAC applicable and properly serving the MME student body. This year, during the open door executive meetings new bylaw additions were proposed, adding a forging committee and writing Alpha Sigma Mu into the CSMMAC bylaws to ensure cooperation and co-support on outreach and social events. These changes were then voted upon on May 1st at a general membership meeting.

Dues: During the Fall and Spring semesters, dues are collected by the Secretary and Treasurer. Members also have the opportunity to pay for both semesters at once if they would like. Dues are \$10 per semester, this money is used to offset the cost of food at meetings and pay for T-shirts at the end of the year.

Elections and Officer Transitions: Elections for CSMMAC were held on March 20th. Following the precedent set by last years executive board, this year's elections were held sooner to allow the new executive board to receive training from the old officers, and observe executive meetings and the planning process. Officer transition documents were updated to inform the incoming exec board of challenges that

were encountered this past year, and advice on planning successful events. The new 2019/2020 executive board hosted the final meeting of the semester where students discussed their MS&T, TMS, and CVD conference experiences. The 19/20 committee also held their first board meeting to begin planning attendance to MS&T 19 and discuss their goals for CSMMAC for the upcoming year.

Point System: Due to generosity from companies that sponsor CSMMAC, we are able to provide subsidies to those wanting to attend conferences. Any member that comes to a general meeting earns five points. Volunteers for outreach events earn 5 points per hour, members who paid dues or went to professional development events such as ASM meetings would earn five points, and those who served in an officer position would earn points ranging from 25 to 35 points. Several weeks before MS&T and TMS, point totals are evaluated and members interested in attending a conference receive funding accordingly. This allows CSMMAC to incentivize and reward those who dedicate time and energy to the organization as well as those interested in developing themselves as young professionals. In the bylaw revisions it was decided that participation in committees earns an additional 10 points per committee.

Officer Duties

Each officer position played a crucial role in the operation of CSMMAC. Executive board roles are laid out in the chapter bylaws. The responsibilities of each role are unique and help delegate the responsibility of running the chapter and successfully planning and executing a wide variety of events.

Chair: The principle point of contact between the chapter and ASM Rocky Mtn. Chapter, the public, partnering societies at Mines, and Colorado School of Mines (CSM). The chair is responsible for all chapter activities and assumes all duties that are not otherwise delegated by the Bylaws.

Vice Chair: Supports the Chair and aids whenever and wherever the Vice Chair can be of assistance to the Chair. Duties include organizing speakers from professional societies, industry, within the department or CSM to present at meetings.

Treasurer: Oversees all the fiscal responsibilities including producing a semesterly budget, tracking membership dues, and documenting CSMMAC funds and expenditures. Serves vital role in club functioning within the requirements of the school.

Secretary: Documents topics discussed at CSMMAC meetings and maintains all chapter records and posting to social media accounts such as the CSM Material

Advantage Chapter page on Facebook. This position includes annual revisions of the bylaws.

Social Chair(s): Coordinate social activities each semester including the Back-to-School/Fall BBQ, End-of-Year Departmental Spring Party, Breakfast Clubs, and much more. The Social Chair(s) plays a key role in member recruitment and retention.

Outreach Chairs: Organize and develop outreach activities to support departmental recruitment, campus events, and community service with an emphasis on exposing STEM to K-12 students. This year three outreach chairs were elected to help manage and support all the outreach events that take place over the course of a year.

Class Representatives: Promote activities happening for each respective grade level and increasing involvement of students.

Keramos Representative: Relayed information to CSMMAC exec board about events happening and worked with Chair to create joint CSMMAC-Keramos events that would benefit both organizations.

Material Advantage Scholarship Database

CSMMAC encourages members to apply for Material Advantage member organization scholarships as well as scholarships associated with materials companies such as Newmont and the Ellwood Group. CSMMAC maintains a document containing information about recurring scholarships and routinely informs members of other scholarships with less consistent application timelines or those recently created. A number of students in CSMMAC were selected to receive scholarships this year, including Stuart Shirley, the president elect, who was awarded the Ellwood Group's Annual Scholarship. At the request of any of the CSMMAC members, the Secretary compiles a list of the scholarships applicable to that member based on class standing and interest (extractive metallurgy, physical metallurgy, ceramics, etc.) complete with a list of the requirements for the scholarship, the due dates and links to relevant information.

Keramos

This was the third year of Keramos working with CSMMAC to put on both outreach and social events. CSMMAC members participated in a hands-on glassblowing workshop in conjunction with Keramos during the spring semester. This was a great social opportunity for the department in addition to learn about the optical and thermal properties of glass. MS&E Day was a large outreach event where 100 6th grade students were brought to campus and toured through multiple materials related stations over the course of a day. The activities at MS&E Day

included a tour of the campus 3D printing lab, walking through a titanium crystal lattice using a virtual reality headset, pewter casting keychains, MME department tours, and other material engineering demonstrations.

One of the primary focuses of Keramos has been to manage the hot glass shop on campus. This duty included hosting Soda Lime Saturday events for the campus as well as for specific groups and organizations. Additionally, the glass shop is used for the Art and Science of Glassblowing class which is an introductory course that has brought many new students to the MME department. One of the goals of Keramos has been to provide opportunities to the campus and department to get hands-on experience with ceramic materials through glass blowing, slip casting, clay forming, and 3D printing, to list a few. The glass shop has been fundamental to accomplishing this goal.