

Chapter Newsletter, 2021, Vol. 1Chair's Message

Hello Cleveland Chapter members!

As we all expected, this year has been way different from years past. Thanks to everyone for being flexible. Many of you have stepped up when we needed it. We are continuing our virtual meetings and we hope that you've been able to join in. We are all learning how to organize and have meetings virtually, but it also opened up for us the ability to have speakers from all over the country. Our first two presenters were from Washington DC, and our Zay Jeffries speaker will be Prof. Carl Koch from North Carolina State.

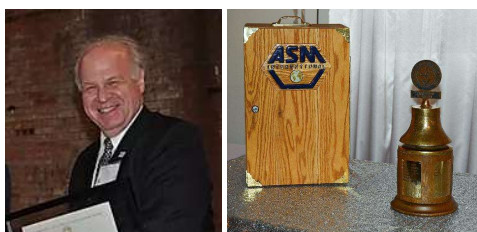
We are currently figuring out the details on how to have student posters sessions virtually at Student Night with RingCentral. We are planning on giving awards of \$150, \$100, and \$50 for the three best, and we'll have George VanderVoort, the dean of metallographers, speaking on biomedical materials.

The Western Reserve Historical Society has agreed to take our historical materials since we are over 100 years old. The paper and electronic files are currently being assembled. Of course, the virus has most people there working virtually, so that will wait until there are people there to accept it and catalogue it.

We are looking for people that may want to be officers next year as Treasurer and Secretary. If you would like to help guide the Chapter over the next few years, we are always looking for people to join the Executive Committee.

Please stay safe and healthy and we hope to see you all sometime this year!

Thanks
Dave K

**Chapter Sponsors**

Special thanks to the following chapter sponsors, whose financial support helps the chapter to put on monthly technical programming, give out scholarships, and serve the interest of our members.



Did you know that Cleveland Chapter has won recognition and awards the last two years in a row from ASM International?

- For 2018-2019, In the Area of Innovative Programming.
- And for 2019-2020, In the Area of Communications.

Cleveland Chapter Officers for 2020-2021

Chapter Chairperson – Dave Kovarik
Chapter Vice Chair – John Pickens
Chapter Treasurer – Joe Snyder
Chapter Secretary – Nic Willis
Email – ASMClevelandChapter@gmail.com

Teachers' Camp Update

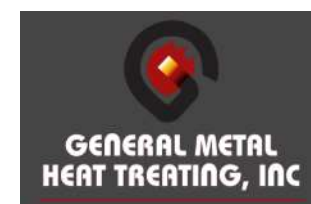
Teacher's Camps were all virtual last year and will be all virtual this year. We have had multiple discussions, both inside the executive committee and with HQ, on how best to promote materials science in the classroom. The cost to the chapter, \$5K from Chapter funds and \$5K from fund-raising, is difficult for the Chapter to adsorb and raise year after year.

Based on the finances of the Chapter for each year, the Chapter may or may not be able to fund a Cleveland camp, but that decision will be made by the Executive Committee. We are pursuing two other ways of reaching out to students to promote materials science – collaboration with the STEM leaders at CWRU, which likely won't happen until the fall, and helping teachers that have gone through a Camp that want to bring materials science into their classroom. We were contacted by a middle school teacher in North Ridgeville. Tom Glasgow is presenting to her classes, and we bought a set of supplies: different metals in the same size cubes and a gram scale to weigh them for a density experiment. We plan on funding more supplies for experiments.

Cleveland Chapter was recently acknowledged and given a 'thank you' by Royal Reeder Lutheran School, for our donation of an electrical weighing scale, to help them serve the need for less shared equipment.



Cleveland Chapter Sustaining Members



In Case You Missed It. A look back at the calendar of RingCentral online meetings!

Tuesday 9/22/2020, Online

Special Topic: "RESIDUAL STRESS MEASUREMENT AND APPLICATION", Guest Speaker: Doug Hornbach – Lambda Research

Mr. Doug Hornbach is President and Director of Laboratory Operations at Lambda Research, Inc.

Residual stresses play a crucial role in the strength and useful life of critical components across many industries. The effective measurement, control, and design of residual stresses will directly impact part performance. In this presentation the following topics were covered.

1. Introduction
2. Residual Stress Measurement Methods
3. Residual Stress Examples
4. Optimization of Residual Stress & Surface Treatments
5. Improving Fatigue Performance and Damage Tolerance
6. Mitigation of Stress Corrosion Cracking

Tuesday 10/13/2020, Online

Special Topic: "Failure Analysis of 787 Fanshaft", Guest Speaker: Erik Mueller

Dr. Erik Mueller is currently a Materials Research Engineer in Washington, DC. He had performed over 100 failure investigations of aircraft, rail, pipeline, and marine transportation accidents.

On July 28, 2012, a Boeing 787-8 airplane experienced a loss of thrust in the right GEnx turbofan engine during a pre-flight, low speed taxi test at Charleston International Airport in Charleston, South Carolina.

A detailed investigation explored multiple and fundamental aspects of the fan midshaft, including manufacturing, assembly, design, and loading. From the investigation, a non-destructive inspection was developed and employed throughout the fleet with multiple changes to the assembly of the engine to prevent future reoccurrences.

Tuesday 11/25/2020, Online

Special Topic: "Electrifying Materials", Guest Speaker: Harold Wallace, Jr.

Harold Wallace, Jr., is curator of the Electricity Collections at the Smithsonian's National Museum of American History.

In this presentation, he discussed some of the many materials found in the Electricity Collections at the Smithsonian's National Museum of American History. From hazardous and exotic components discovered in unexpected places to the challenges presented by aging objects.

Tuesday 12/15/2020, Online

Special Topic: Publishing in the Heat Treat Industry: Why Words are Better Than Numbers & Other Fascinating Topics, Guest Speaker: Doug Glenn, Founder and Publisher, Heat Treat Today

Doug Glenn, Founder & Publisher, Heat Treat Today
Doug Glenn has been in the heat treating publishing business for over 26 years.

Mr. Glenn took a brief stroll down memory lane as he recounted the heat treat industry's publishing history and shows how it is that we got where we are today with respect to heat treat magazines and websites. He'll also delved into why engineers & metallurgists need to get more comfortable with words and abandon their fascination with numbers and equations.



Mr. Doug Glenn

Tuesday 1/19/2021, Online

Special Topic: A Forensic Investigation of Origin for the Image & Shroud of Turin Using Material Analytical Techniques, Guest Speaker: David Onysko

The image on the Shroud of Turin has confounded the world for centuries. Despite the scientific community's best efforts, the Shroud defies complete understanding and has resisted repeated attempts toward an explanation of the image-formation process. It has been described as "acheiropoietos" (not made with human hands). It has been thought by some to have been formed by a process known as "flash photolysis". Still others believe the cause for the superficial image seen on the shroud's uppermost fibrils is the result of a yet-to-be-understood form of radiant energy. The image on the Shroud is seen by many as a "presence"; that etched upon its linen fabric, this enigmatic burial cloth reflects the image of a man with wounds from a flogging and crucifixion. Forensic evidence will be presented that are based within multiple disciplines, including: Historical records and Biblical records, Photographic and holographic analyses, Material science characterizations Microscopic analyses, Medical science: biology, anatomy, genetics, Geology, Botany.

David Onysko is a life-long resident of Cleveland, Ohio. In 1983, he earned a Bachelor of Science Degree from Cleveland State University with a teaching emphasis in health and physical education (K-12). In 1991 he earned a post graduate degree, also from CSU, achieving a Master in Education with an emphasis in curriculum and instruction. In 2012, after 25 years of teaching, he shifted his attention to something he has pursued since 1980...his continued interest in Sindonology (the study of the Shroud of Turin). Over the years, David's interest in this enigmatic burial linen has led him to many scientific/theological conferences (St. Louis, Rome, Dallas, New York, Virginia, etc.). He has spoken to thousands, including international audiences. In April 1998, prior to the World Exposition to follow, David and a world-wide press corp viewed the Shroud during a private 45 minute showing. In August 2000, David and his family traveled to Turin, Italy to see the image during the Shroud's Jubilee Exposition. He has been presenting the continuing story of the Shroud of Turin since the late 1980s.

Stay Tuned For These Upcoming Meetings!

Tuesday 2/16/2021, Online

Special Topic: Power Conversion Advances via Magnetic Materials Fabrication & Characterization Research, Guest Speaker: Dr. Alex Leary

Alex M. Leary is a Research Materials Engineer at the NASA Glenn Research Center in Cleveland, OH.

Efficient, high power density electric systems are enabling technologies for electrified aircraft and present several materials challenges. Advanced soft magnetic materials are needed to match the performance of high band-gap semiconductors for operation at higher switching frequencies. This talk will examine the role of soft magnetic materials in medium frequency (1 kHz - 1 MHz) applications with an emphasis on achieving high power density at high power (>1 MW). Operation in this range is traditionally limited by heat losses produced by the materials that degrade efficiency and thermal performance. Ongoing work in the Materials and Structures Division at NASA Glenn Research Center, in collaboration with external partners, will be reviewed with emphasis on the synthesis, structures, and properties of nanocomposite magnetic materials. Recent advances in the composition variation and processing of these materials allows for tunable permeability control over a wide range (10-100,000) that enables gapless core designs. The impact of this technology is three-fold: it can reduce the size and power losses in electromagnetic components of a given rating; it is scalable to MW sized electrical systems; and it allows for new power electronic designs not possible with traditional materials. Comparisons will be made to commercial soft magnetic materials and the impact at the device level in recent prototypes will be discussed.



March 2021 (DATE TBD)

Special Topic: Students' Night: Metallography on Biomedical Implant Materials

Guest Speaker: George Vander Voort, PhD

Monday 4/12/2021, ZAY JEFFRIES NIGHT

Special Topic: Low Density, High Entropy Alloys

Guest Speaker: C. C. Koch, PhD

High entropy alloys are a new class of multi-component alloy systems in which the design of the alloys is based not on adding solutes to a single “base” element, but rather on choosing elements that will form solid solutions when mixed at near-equiatomic concentrations. Structural materials with low densities and good mechanical properties have been sought after for many years. The new paradigm in alloy development /materials science of so-called high entropy alloys offers greatly expanded possibilities for development of such alloys. For the purposes of this talk, “low density” will be defined as densities less than that of titanium, e. g. 4.5 g/cc. There have been a relatively limited number of studies of low density high entropy alloys. These will be briefly reviewed. Our group developed a fascinating alloy $\text{Al}_{20}\text{Li}_{20}\text{Mg}_{10}\text{Sc}_{20}\text{Ti}_{30}$ which was prepared by ball milling of powders. The as-milled alloy exhibited a single phase fcc structure and had a remarkable hardness of about 6 GPa. After annealing, the alloy transformed to the hcp structure, which is believed to be the equilibrium phase. A somewhat contaminated alloy containing higher levels of oxygen and nitrogen was found to remain fcc at 500oC and mostly fcc even at 800oC. Since ball milling of powders (mechanical alloying) is a non-equilibrium synthesis method, it was found that the structures and hardness of this alloy are very sensitive to milling parameters and composition. Since Sc is so expensive, several other elements have been substituted for it in this alloy and the results will be reported.

Carl Koch received his Ph.D. in metallurgy from the Case Inst. of Technology (now Case Western Reserve University) in 1964. After serving as an NSF Fellow at Birmingham University, UK, he joined Oak Ridge National Laboratory as a staff scientist in 1965. He was the group leader of the superconducting materials and then the alloying behavior and design group before he joined North Carolina State University, Department of Materials Science and Engineering, as a professor in 1983. He is now Kobe Steel Distinguished Professor of materials science and engineering. He has made significant contributions to understanding of mechanical alloying for preparation of amorphous and nanostructured alloys. It is in this context that processing has become an important part of his research. More recently he has carried out research on high entropy alloys. He has published over 360 papers and edited or co-edited 7 books. In October 1995 Dr. Koch was cited in Science Watch for the third highest number of citations per paper in the world for high-impact articles in materials science for 1990 through 1994. He has achieved the rank of Fellow in professional societies, including the Minerals, Metals, and Materials Society (TMS), (the membership is limited to 100 living Fellows), the Materials Research Society (MRS), the American Physical Society (APS), ASM International, and the American Association for the Advancement of Science (AAAS). He was elected into the U.S. National Academy of Engineering in 2013.



Join ASM Cleveland Executive Committee!

On behalf of the nominating committee for the Cleveland Chapter of ASM, I am looking for Leaders for 2021-2022 and beyond. We are currently looking for Treasurer, Secretary, and Executive Committee Members. Please contact me to get involved at: rosanne@mtnrep.net or 216 217-7769.

Thank you,
Rosanne Brunello