American Nuclear Society Student Section at The Ohio State University

May Newsletter

This Month's ANS Events:

There are no events this month, but stay tuned for our Fall 2026 events by looking at our website!

Stay Connected with the "Nuclear World" at OSU!

Nuclear Engineering Minor Classes

Are you scheduling classes for Fall 2026? Well take a look at the classes the Nuclear Engineering Minor has to offer on their webiste!

ANS Announcements:

ANS GroupMe

For more information about all things ANS and a platform to connect with ANS members, join our new GroupMe platform!

Good luck with exams and ANS will see you all in the fall semester! Have a great summer!

Faculty Spotlight

Dr. Calvin Stewart



Dr. Stewart is a College of Engineering Innovation Scholar and Associate Professor in the Department of Aerospace and Mechanical Engineering and Department of Materials Science and Engineering. Dr. Stewart directs Materials at Extremes which focuses on the advanced manufacturing, mechanical testing, and theoretical mechanics of materials subject to thermal, mechanical, and chemical extremes. His areas of expertise include Advanced Manufacturing including Laser Powder Bed Fusion (LPBF), Bound Metal Deposition (BMD), Fused Deposition Modeling (FDM), Mechanical Testing including Creep, Fatigue, Fracture, Creep-Fatigue, Thermomechanical Fatigue, and Theoretical Mechanics including Constitutive Modeling, Continuum Damage Mechanics, Machine Learning, Probabilistic Modeling, and Monte-Carlo Methods. To learn more about Dr. Stewart and his research visit the Department of Mechanical and Aerospace Engineering website.

What are some projects that you are currently working on that you are most excited about, and what can you tell us about them?

We are using Additive Manufacturing, specifically directed energy deposition (DED) to create what are called "functionally graded materials". The idea is to craft components that slowly transition from one material type to another, enabling components with multifunctional capabilities. As we all know, there is no one material that can survive all harsh conditions observed within a nuclear reactor. We need materials with superior radiation resistance, heat transfer capabilities, mechanical strength, and creep, cracking, and corrosion resistance. By blending dissimilar materials together, it might be possible to make unique parts that are resilient to multiple conditions at strategic locations within a part.

What inspired you to pursue a career in nuclear science?

I've always been fascinated with deep space travel. Some of the earliest deep space missions concepts (developed by NERVA in the 60's) focused on nuclear power for propulsion and power. One of the most famous and crazy was Project Orion, where a series of atomic explosions would be used to push a spacecraft into deep space. I'm glad that one stayed a concept. In our modern era, radioisotope thermoelectric generators (RTG) have been used in various spacecraft and satellites. Research is ongoing for nuclear-powered space stations and bases on the Moon and Mars. It's an exciting time.

How did you first become interested in your specific research area?

My research focuses on high-temperature structural materials. I guess I first got interested in this area as an undergraduate student in Machine Design where I learned about fatigue of materials and the various environmental factors, including radiation, which contribute to weakness. As I took more courses and got opportunities to pursue internships and undergraduate research, I naturally started specializing in this area.

How does your work connect to real-word applications or industry needs?

My work focuses on understanding the mechanics of materials in extreme environments. As we push for power, speed, and efficiency, we push the materials to untested limits. My research is all about manufacturing materials for extremes, testing them in simulated conditions, and developing new equations that describe their behavior. These materials, data, and models can be used to help design the next generation of machines.

What is your favorite class to teach and why?

Engineering Fracture Mechanics. It is a cross-listed course, so it include both undergraduate and graduate students. It is an important topic for the design of machines, as it focuses on the resistance to cracking in structures. The course covers the history of fracture through a review of engineering disasters, goes into detail on the mathematical derivations for the main cracking parameters, and ends (when I teach it) with practice experiments in a lab. Super fun to teach and super interesting for students to take.

What is one piece of advice you would give to someone pursuing a career in the nuclear field?

Concern yourself not only with the theory and mechanics of your field but also with the safety and ethical implications of your work.

What is an example of a nuclear advancement that you hope to see in the next ten years?

The US plans to deploy a nuclear reactor on the Moon by 2030 to support a sustained mission and longer-term lunar infrastructure.

Are you a member of the American Nuclear Society? If so, what have you learned or how have you benefited from being a part of this organization?

No. I am not a member.

If you could collaborate with any person or lab in the world, who would it be and why?

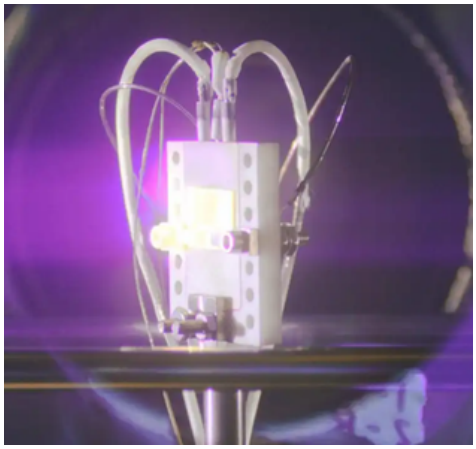
It would be amazing to work with CERN and the particle accelerators they have built to image the deformation within the microstructure of materials under harsh conditions.

Do you have a favorite element or isotope?

Hydrogen + Oxygen = Life + Power

What's New with Nuclear?

Nuclear Batteries and the Race to Fusion Power



Fusion reactions release a lot of energy by fusing two lighter atoms into a heavier one. But harvesting that energy for electricity has proven to be challenging. According to Daniel Valasquez, materials science lead at Avalanche Energy, plenty of fusion reactors already exist, but reactors that make electricity are the real challenge and what industry wants to see in the future.

The most common approach to produce fusion reactions is to heat water and spin a steam turbine, but that approach actually isn't that effiecent, harnessing around 60% of power. Avalanche Energy thinks it can capture more of that energy by developing new materials known as radiovoltaics.

Radiovoltaics are similar to photvoltaics, or tradtional solar pannels, in that they use semiconductors to transform radiation into electricity. Existing radiovoltaics are easily damaged by the radiation they harness and don't actually produce much electricity. But, Avalanche was recently awarded millions of dollars from DARPA to develop new radiovoltaics. And eventually apply their gained knowledge to a new reactor part.

To learn more about Avalanche Energy and their goals to futher the field of fusion energy visit the article by TechCrunch!

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