

MSE SEMINAR

April 13, 2018
113 McBryde Hall
3:30 – 5:00 PM
Refreshments at 3:00 PM

Mackenzie Jones

**Graduate Student
Materials Science and Engineering, Virginia Tech**

“Deformation Mechanisms and Energy Absorption of TWIP Steel Cellular Structures”

ABSTRACT

Owing to deformation twinning and dislocation-twin interactions, twinning induced plasticity (TWIP) steels are able to undergo extensive plastic deformation with significant strain hardening, resulting in high strength, high ductility, and therefore high energy absorption. Coupling this intrinsic material capability with an architected honeycomb topology can further improve the energy absorption efficiency while simultaneously achieving lightweighting. In this talk, we explore this intriguing phenomenon by fabricating architected TWIP steels through investment casting of 3D printed designs and performing in situ mechanical testing using digital image correlation. The energy absorption capability is strongly dependent on geometrical factors, e.g. the strut diameter to length ratio, which can lead to bulk-like, bending-dominated, and buckling-dominated regimes. For the same geometrical design, the energy absorption capability is substantially influenced by the microstructure and grain size. These results pave the road towards using architected TWIP steels in critical applications such as vibration damping and crashworthiness.

BIOSKETCH

Mackenzie Jones is a graduate student in Dr. Hang Yu's research group with support from the Charles Blankenship Scholarship. She graduated from Virginia Tech with a bachelor of science in Materials Science and Engineering and with a Green Engineering minor in 2017. During her undergraduate career, she was the music minister at her church, the vice president of her a cappella group, an active member of her honors living community, and attended conferences with MEPS. Her research focuses on twinning induced plasticity (TWIP) steel and solid-state metal additive manufacturing. She has presented her work in TMS 2018 and MS&T 2017. After finishing her master's thesis, she will pursue her PhD with Dr. Yu as an NSF Graduate Research Fellowship Program (GRFP) Fellow.