
Thursday, February 11, 2021 | 3:00 PM – 4:00 PM
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“Additively manufactured metals: microstructures and mechanical behavior”

Presented by [Professor Allison Beese](#)

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The unique thermal histories (i.e., rapid solidification followed by repeated thermal cycles with the addition of layers) seen in additive manufacturing (AM) of metal alloys results in microstructures that may contain phases, grain morphologies, or internal pores different from those seen in their conventionally processed counterparts. These microstructures dictate the resulting mechanical properties of the alloys; thus, to enable the adoption of AM for structural applications, an understanding of the links between microstructure and deformation and/or fracture is required in order to safely and reliably design against failure. In this talk, I will present our work on experimentally and computationally investigating the impact of these unique microstructures on the deformation and failure behavior of additively manufactured alloys. I will discuss our efforts in measuring and modeling the multiaxial plasticity and fracture of these materials. Additionally, I will describe our work on designing, fabricating, and characterizing functionally graded materials in which the chemistry is intentionally changed as a function of position to impart disparate properties as a function of position within a 3D component.



Professor Allison Beese received her B.S. in Mechanical Engineering from Penn State. She then worked at Knolls Atomic Power Laboratory before entering graduate school. She earned her M.S. and Ph.D. degrees in Mechanical Engineering from MIT. She spent two years as a postdoctoral fellow at Northwestern University, and joined the Materials Science and Engineering Department at Penn State in 2013. She has received an NSF CAREER award, the 2018 TMS AIME Robert Lansing Hardy Award, the 2017 International Outstanding Young Researcher in Freeform and Additive Manufacturing award, and a 3M non-tenured faculty award.