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Designing Intermetallics for Additive Manufacturing

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ABSTRACT:

Modern materials contain extraordinary levels of complexity, with components spanning a hierarchy of length scales. Designing materials with complex microstructures and demonstrating unique behaviors would be difficult solely using a reductionist approach to materials development. A powerful utility in this endeavor is the use of multiple, correlative, and scaffolding computational tools. This talk focused on using an integrated materials design approach spanning electronic structure calculations to thermodynamics modeling and paired with combinatorial experimental methods to produce a high-temperature aluminum-based intermetallic for additive manufacturing.

BIOGRAPHY:

Michele Manuel is a Professor and Department Chair of the Department of Materials Science and Engineering at the University of Florida. She received her Ph.D. in Materials Science and Engineering at Northwestern University and her BS in Materials Science and Engineering at the University of Florida. Dr. Manuel is a member of the U.S. National Academy of Engineering and a Fellow of ASM International. She is also the recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE), NSF CAREER, NASA Early Career Faculty, ASM Bradley Stoughton Award for Young Teachers, AVS Recognition for Excellence in Leadership, TMS Early Career Faculty, TMS Brimacombe Medalist, and TMS/JIM International Scholar Awards. Her research lies in the basic understanding of the relationship between processing, structure, properties, and performance. She uses a systems-based materials design approach that couples experimental research with theory and mechanical modeling for the accelerated development of materials. Her current research focuses on using systems-level design methods to advance the development of new materials through microstructure optimization.