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TMS2019

148th Annual Meeting & Exhibition

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March 10–14, 2019
San Antonio, Texas, USA

JOIN US FOR THIS TMS2019 SYMPOSIUM:

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Solid State Processing of Metals and Ceramics

The most popular techniques for additive manufacturing (AM) of metals (e.g. powder bed fusion or directed energy deposition) utilize high-energy beams (e.g. lasers or electron beams) to directly fuse metal powders into bulk components. However, while these processes are promising for specific forms of production, they can be relatively expensive and energy-intensive. Furthermore, these processes result in complex thermal histories, which can produce large residual stresses along with difficult to predict and anisotropic microstructures and mechanical properties. As an alternative, a suite of non-fusion AM processes have been developed or are under development for the production of metal and ceramic components. In general, these processes use AM to produce "green" parts that are subsequently consolidated into bulk components using powder consolidation techniques, such as debinding and sintering. Similar to powder injection molding, metal or ceramic powder can be mixed with a polymer blend to produce pellets or filament that are formed into green parts via extrusion AM (e.g. fused filament fabrication). Additionally, powder can be mixed with a photopolymer resin to produce green parts via AM photopolymerization processes (e.g. stereolithography). Other techniques for producing green parts via AM exist. Such processes address the high capital and operating costs along with the residual stresses and microstructural concerns of fusion-based AM. Additionally, these processes could enable the development of mobile machines for in-field production of metal and ceramic components.

Example topics for this symposium include, but are not limited to:

- Binder/polymer/resin development
- AM process design/modification/optimization
- Debinding, sintering, and characterization of both green parts and bulk components

Furthermore, presentations on both modeling and experimental efforts are encouraged.

ORGANIZERS

James D. Paramore, U.S. Army Research Laboratory, USA
Matthew Dunstan, U.S. Army Research Laboratory, USA
Amy Elliott, Oak Ridge National Laboratory, USA
Markus Chmielus, Cornell University, USA
Nihan Tuncer, Desktop Metal, USA