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#TMSAnnualMeeting



SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2024 SYMPOSIUM:

ADDITIVE MANUFACTURING

Additive Manufacturing and Innovative Powder/Wire Processing of Multifunctional Materials

Powder and Wire Metallurgy (PW/M) is a commonplace fabrication and processing method for high throughput part production in industrial settings. Additionally, PW/M fabrication and processing advancement also is an essential counterpart to the advancement of additive manufacturing (AM) with powder-based AM methods. Novel and intensive research is ongoing in innovative, traditional, and emerging magnetic materials and functional materials; however, the practical application is limited by the ability to form these typically brittle materials into the shapes that are designed for the applications. At this time, advanced powder synthesis and processing, including additive manufacturing, can provide a way to form these materials into final shapes for applications.

The purpose of this symposium is to tie both magnetic and functional materials to advanced powder synthesis and additive manufacturing, as well as other advanced processing approaches and discuss aspects such as process-property relationships, functionality, and/or application performance. Magnetic and functional material systems of interest include, but are not limited to:

- Soft magnets (nano-crystalline alloys, high Si-steel)
- Hard magnets (Nd-Fe-B, Sm-Co, MnAlC, MnBi, alnico, ferrite, exchange-coupled)
- Magnetocaloric materials (Gd-Si-Ge, Gd-Ni-X, RE-RE, RE-Al)
- Magnetic Shape Memory Alloys (Ni-Mn-Ga(-X))
- Shape Memory Alloys (NiTi(X), Fe-based, Cu-based)
- Magnetostrictive materials (Terfenol-D, Ga-Fe, Gd-Co)
- Thermoelastic (shape memory) Materials (TiNi)
- Thermoelectric Materials (Si-Ge, Bi-Te)
- Piezoelectric Materials (lead zirconate titanate (PZT), barium titanate and lead titanate)
- Lightweight Structural Materials
- Structural Materials
- And other materials

Topics of interest for clean powder and wire synthesis include, but are not limited to:

- Atomization (water, gas, rotational, ultrasonic, plasma)
- Mechanical comminution (multi-jet or single jet milling, high energy ball milling)
- Extrusion of metals
- And other powder and wire synthesis approaches

Topics of interest for advanced powder processing of magnetic/functional materials include, but are not limited to:

- Additive manufacturing (binder jet, directed energy deposition (DED), colloidal deposition, electron beam melting powder bed fusion (EBM/PBF), laser/powder bed fusion (L-PBF), fused filament fabrication (FFF), Wire Arc Additive Manufacturing (WAAM), atmospheric pressure plasma deposition (APPD), and stereolithography)
- Metal injection molding
- Spark plasma sintering
- Compression molding and sinter
- Vacuum hot pressing
- Hot isostatic pressing
- Functional post-processing (directional recrystallization, magnetic annealing (large or moderate magnetic fields))
- And other methods

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SYMPOSIUM SPONSORS

TMS Functional Materials Division
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