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ANAHEIM CONVENTION CENTER & ANAHEIM MARRIOTT
ANAHEIM, CALIFORNIA, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2022 SYMPOSIUM:

ADDITIVE TECHNOLOGIES

Additive Manufacturing: Materials Design and Alloy Development IV: Rapid Development

While additive manufacturing (AM) offers a new paradigm in part design for complex architectures, the availability of additive-capable existing or new materials is minimal. The need for materials and alloys designed specifically for additive technology is increasing rapidly, and many new approaches have been developed to address this need.

Traditional alloy development processes and technologies are usually time consuming and very costly. Meanwhile, both the fast pace of AM technology growth from one direction and continuous needs for better and higher performing materials in critical industries such as aerospace, aviation, and medical from another direction makes a tremendous driving force for rapid alloy development in additive manufacturing.

Conventional alloys are designed based on constraints of conventional materials processing and manufacturing technologies such as casting, forging and hot rolling or sheet metal forming. The unique solidification conditions during these processes have made expanding current conventional alloys to AM difficult and made the introduction of new designed materials a technology challenge. Additionally, the intrinsic properties of AM (i.e., rapid solidification, melt pool dynamic, cyclic heat treatment) can be exploited to design novel materials.

Integrating materials, design, and manufacturing innovation is a new frontier that requires critical attention to harness the full potential of AM technology. This symposium is focused on computational and experimental approaches which enable rapid development of composition, structure, and property response surfaces for new alloy development. This symposium will highlight research in novel alloys and application driven material design with a focus on how a fundamental understanding of the thermodynamic and kinetic boundary conditions, as well as using ICME approaches, machine learning, and artificial intelligence can enable rapid development of new alloy systems for AM. The use of reduced build volumes, small batch alloy runs, welding studies, and compositionally graded materials have begun to shed light on the alloy design envelope in AM. While important, quality control and defect detection are not in the scope of this symposium and submissions should focus on the inherent material properties possible in a system of interest.

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