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Additive Technologies

Additive Manufacturing: Materials Design and Alloy Development II

The need for materials and alloys designed specifically for additive technology is increasing rapidly. 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 Additive Manufacturing (AM) difficult and made the introduction of new designed materials a technology challenge. What is more, the intrinsic properties of AM (i.e., rapid solidification, melt pool dynamic, cyclic heat treatment) can be exploited to design novel materials. Integrating materials and manufacturing innovation is a new frontier that requires critical attention to harness the full potential of AM technology.

The goal of this symposium is to highlight research in two major materials development categories 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 enable introducing new alloy systems for additive manufacturing. The technical challenges to be addressed in materials design for additive manufacturing include, but are not limited to, hot tearing and solidification cracking, secondary deleterious phase formation, porosity and vaporization, melt-pool stability, etc. Understanding the materials responses and behavior as well as the phase transformation phenomenon in these processes are the key and crucial concepts to the adoption of these additive manufacturing methods.

Technical sessions will emphasize the following three major categories:
- Existing alloys adapted to/modified for additive manufacturing
- Novel alloys designed for additive manufacturing
- Accelerated materials development and adoption

Both experimental and modelling submissions are encouraged, especially in which modelling or theory is applied and validated experimentally. Materials systems of interest include, but are not limited to, structural materials, different types of steels, aluminum, titanium, nickel, cobalt, copper, high entropy alloys, and bulk metallic glasses. Functional materials will also be considered.

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Abstract Deadline is July 1, 2019. Submit online at
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Questions?
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