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TMS 2023

152nd Annual Meeting & Exhibition

MARCH 19–23, 2023
SAN DIEGO CONVENTION CENTER &
HILTON SAN DIEGO BAYFRONT
SAN DIEGO, CALIFORNIA, USA
#TMSANNUALMEETING

SUBMIT AN ABSTRACT BY JULY 1 FOR THE FOLLOWING TMS2023 SYMPOSIUM:

MATERIALS PROCESSING

Advanced Characterization of High-temperature Alloys: Phase Evolution during Manufacturing and Service-induced Deformation

High temperature alloys, including Ni-based, Ni-Fe-based, and Co-based superalloys, are critically important in enabling technological advancements from the aerospace to the power generation, chemical processing, and manufacturing industries to atomic energy. Fundamental to the performance of these materials are their deformation characteristics, both in terms of the deformation necessary during manufacture as well as the deformation sustained during service. Critical developments in the field of high temperature alloys in recent years have been reliant on controlling and utilising deformation and deformation induced phase transformations to achieve superior performance at increasingly higher temperatures. Such advances have been further enabled by the unparalleled innovation in the advanced characterization methods and data analysis tools used to investigate deformation characteristics in these materials, such as dynamic TEM, atom probe tomography, high resolution EBSD, advanced neutron and synchrotron X-ray diffraction, and resonant ultrasound spectroscopy, to name a few.

The aim of this symposium is to bring together the community to discuss the effect of deformation on microstructural control and performance in high temperature materials (Ni, Ni-Fe, Co superalloys, refractory metal alloys, multi-principal element alloys) through the lens of advanced characterization. The proposed technical scope of the symposium includes, but is not limited to:

- Novel insights into deformation mechanisms obtained from advanced characterization and modelling validation methods; including elemental segregation, phase-specific deformation characteristics and defect evolution
- Deformation assisted microstructural control of high temperature alloys during manufacturing processes (including powder metallurgy and additive manufacturing methods)
- Deformation determined in-service performance of materials for high temperature structural applications (including mechanical performance as well as environmental resistance)
- Co-operative chemistry and processing design for improved alloy performance
- Deformation effects on “finishing operations” including machining, heat treatment, and shot peening
- Effect of deformation on phase and property evolution
- High throughput methodologies for deformation assessment in manufacturing and in service performance
- Role of deformation in phase transformations and microstructural evolution
- Non-destructive and correlative evaluation of deformation accumulation during manufacturing and under in service conditions

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