EUROMAT 2019 / Area B: Structural Materials

SYMPOSIUM: B6

Title: High-Entropy Alloys

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Abstract

This symposium will provide a venue for presentation of research progress on the experimental discoveries and theoretical modeling of high-entropy alloys (HEAs), covering alloy design, processing, microstructures, and structural and functional properties.

In contrast to conventional alloys, which are based upon one principal element, HEAs have multi-principal elements, often four or more. The significantly high mixing entropy of the solid solution stabilizes the solid-solution phases in face-centered-cubic (FCC), body-centered-cubic (BCC), and hexagonal close-packed (HCP) structures against intermetallic compounds. Moreover, carefully designed HEAs possess tailorable properties that far-surpass conventional alloys. Depending on alloy systems, such properties include strength, ductility, corrosion and oxidation resistance, fatigue and wear resistance, and functionality like superconductivity, thermoelectricity and catalysis. These properties will undoubtedly make HEAs of interest for use in various structural and functional applications. Given the novel and exciting nature of HEAs, they are poised for significant growth.

Topics to be covered include:

- Material fabrication and processing, such as casting and powder metallurgy, including additive manufacturing, and thermomechanical treatments
- Advanced characterization, such as synchrotron and neutron scattering and three-dimensional (3D) atom probe tomography
- Mechanical behavior, such as fracture, fatigue, creep, and micro/nano-mechanics
- Functionality, such as magnetic, electric, thermal, catalytic and biomedical behavior
- Corrosion and oxidation behavior
- Coating and surface treatment
- Theoretical modeling and simulation using density functional theory, molecular dynamics, Monte Carlo simulations, phase-field and finite-elements method, and CALPHAD modeling
- Industrial applications