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TMS 2017
146th Annual Meeting & Exhibition



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San Diego, California, USA

MATERIALS FOR HIGH-TEMPERATURE APPLICATIONS: NEXT-GENERATION SUPERALLOYS AND BEYOND

Nickel-based superalloys possess an excellent combination of mechanical properties and environmental resistance at elevated temperatures, and they have been widely used in challenging environments such as aircraft engines and land-based power-generation gas turbines, as well as nuclear power and chemical plants. The ever-increasing demand for higher operating temperatures to achieve better fuel efficiency has been driving the development of the next generation of superalloys, in which the higher temperature capability has been achieved by increasing additions of refractory elements, optimizing processing conditions and application of coatings. However, there has been a strong need of materials that can make a significant change in temperature capability beyond Ni-base superalloys. Refractory metal-based alloys and refractory metal-based intermetallics have been recognized as strong candidate materials.

The goals of this symposium are to discuss recent progress in development of high-temperature material systems that can offer capabilities beyond Ni-base superalloys and to understand their latest status, entitlement, and limitations, as well as to understand current challenges that Ni-base superalloys are facing. Topics for discussion include thermodynamics, microstructural design and long-term stability, processing, physical properties, mechanical behavior, and environmental resistance of:

- Current and next-generation Ni-base superalloys
- Refractory metal-based materials
- Intermetallic-based materials
- Coatings

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