

MM 19: HV Glatzel

Time: Tuesday 14:00–14:30

Location: H16

Invited Talk

MM 19.1 Tue 14:00 H16

Development of Platinum-Based Superalloys by Optimization of Microstructure — •UWE GLATZEL — Metallische Werkstoffe, Universität Bayreuth, Ludwig-Thoma-Straße 36b, 95447 Bayreuth

Development of platinum-based superalloys was carried out by copying the successful system of nickel-base superalloys. The Pt-alloys should have a two-phase microstructure, consisting of a $L1_2$ -ordered intermetallic Pt_3Al phase (γ' phase) coherently embedded in a Pt-matrix. Additionally volume fraction, lattice parameter misfit and size of the precipitates have to be optimized. In a first step composition and heat treatment was adjusted to achieve high volume fractions of cuboidal

γ' precipitates with a cube size of about 500 nm. Volume fractions of up to 50% could be obtained by ensuring a reasonable temperature window to allow homogenization heat treatment.

By a variation of the Ni-content the misfit between matrix and γ' phase can be adjusted within the desired range of $-3 \cdot 10^{-3}$ up to $-1 \cdot 10^{-3}$. Compression and tension creep tests were carried out. Considering low temperature ductility and testing in air, our optimized alloy results in creep resistance higher than known alloys at a temperature of 1300°C. Additional improvements can be obtained by adding boron in small amounts. Alternatively directional solidified casting would be a promising processing route, which is currently under development.