Workshop »Coatings for Tools & Components«

HELN-based coatings, properties, perspectives

Tim Krülle[1,2], Martin Kuczyk[1,2], Martin Zawischa[2], Dr. Otmar Zimmer[2], Dr. Jörg Kaspar[2], Prof. Dr. Christoph Leyens[1,2], Prof. Dr. Martina Zimmermann[1,2]

[1]Technische Universität Dresden; [2]Fraunhofer Institute for Material and Beam Technology Dresden

tim.kruelle@tu-dresden.de

High entropy alloys are interesting not only as a material class for high-temperature applications but also for thin-film applications. Nitride hard coatings based on high entropy alloys share many positive properties with their metallic counterparts, such as high strength or high thermal stability.

During this work a selection of such coatings, like Al-containing and Al-free coatings, was prepared by vacuum arc technology and investigated concerning chemical, mechanical and structural properties. For this purpose, various design strategies, such as layering, doping or different gas atmospheres for the deposition of HEA coatings are discussed and their influence on the plastic and elastic properties as well as the damage tolerance of these films are analysed. Further attention is given to investigations on the fracture toughness of HEA coatings compared to conventional nitride hard coatings such as AlTiN.

The presentation will give an overview about the methodology, the results achieved and an outlook on future perspectives and questions around these films.