Poster-Session

Structural and compositional evolution of MoS_2 coating and transfer layer during friction experiments in different atmospheres

Dr. Aurelio García-Valenzuela[1], Lars Lorentz [2,3], Dr. Frans Munnik[1], Dr. Stefan Makoswki[2], Dr. Matthias Krause[1]

[1]Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany; [2]Fraunhofer Institute for Material and Beam Technology (IWS), Dresden, Germany; [3]Institute of Manufacturing Technology (IFW), Technische Universität Dresden, Dresden, Germany.

matthias.krause@hzdr.de

Molybdenum-disulfide (MoS_2) is an efficient lubricant for space applications due to its excellent properties in vacuum. However, it is well established that the performance of MoS_2 breaks down in the presence of oxygen and water, to the present state of knowledge, due to oxidation to MoO_3 and disruption of van der Waals sliding. Still, no clear evidence of the structural evolution of the material during the experiment has been reported. In this study, the evolution of the compositional and structural properties of Laser-ARC deposited MoS_2 coatings and their transfer layers are studied after friction experiments in vacuum, dry and humid air environments to elucidate the effect of oxygen on the friction behavior. Laterally and depth-resolved element maps obtained by μ-beam RBS and Raman spectroscopy maps reveal a much more complex structure evolution of tranferred MoS_2 in the contact areas and imply a much smaller involvement of oxides than assumed so far (Figure).