

PO1053

The Influence of Cathode Grain Size on the Arc Process and Coating Properties

Jianqiang Zhu¹, Mats Johansson², Peter Polcik³, Mats Ahlgren⁴, Johanna Rosén¹, Lars Hultman¹, Magnus Odén¹

¹IFM, Linköping University, Linköping, Sweden ²Seco Tools AB, Fagersta, Sweden ³Plansee Composite Materials GmbH, Lechbruck am See, Germany ⁴Sandvik Tooling, Stockholm, Sweden

zhu@ifm.liu.se

In this work, the influence of the cathode's microstructure on the cathodic arc process and the deposited coatings' properties is studied by analytical electron microscopy in combination with X-ray diffraction and X-ray photoelectron spectroscopy. Three dedicated 32 mm thick disk-shaped Ti-Si 80/20 at% Cathodes with different grain sizes of ~10 µm, ~100 µm, ~1000 µm, were manufactured by spark plasma sintering. They are found to generate arcs with different movement behavior during arc process. The near surface region of all three cathodes after arcing shows altered microstructure and composition compared with the virgin state. The surface roughness of the cathodes after arcing varies significantly with their grain sizes. A finer the grain size results in a smoother worn surface. The consequent impacts of varying the grain size of the cathodes on the coating properties, including its microstructure, element stoichiometry, droplets density etc., are also addressed in this work.

Keywords

Ti-Si cathode
grain size
deposition rate
electron microscopy
microstructure