

OR0403

Nanostructured hard coatings thicker than 100 μm , prepared by arc technologyFrank Kaulfuß¹, Christian Endter¹, Otmar Zimmer¹, Andreas Leson¹¹Fraunhofer IWS, Dresden, Germany

frank.kaulfuss@iws.fraunhofer.de

Film design in the nano scale offers new perspectives concerning the properties and applications of hard coatings. Hardness, intrinsic stress state, thickness and thermal stability of the films are only a few points of interest. The typical way for optimization is the adjustment of composition, grain size distribution and layer structure.

The recent paper presents actual results of the design of Al-Cr-N based nanocomposites, prepared by arc technology.

It could be shown, that films with high hardness, low stress level and a thickness $> 100 \mu\text{m}$ can be deposited with coating rates up to $20 \mu\text{m}/\text{h}$. Structural investigations, for example by transmission electron microscopy (TEM), show a nano grained structure with mixed orientations and also a certain level of amorphisation. An interesting effect is the embedding of defects (for example particles) and the suppression of further failure propagation by a nano layered structure. This is the key condition for the growth of thick and homogeneous coatings.

Thicker films are interesting for many applications. A mechanical post treatment of coated parts is possible and a remarkable longer life time of coated components can be achieved.

Keywords

Hard coatings

Thick films

PVD

Arc technology