Contribution ID: **325** Type: **Poster**

Formation and structure of TiN/ZrN multilayer coatings deposited on tool steel

Wednesday 20 June 2018 18:00 (20 minutes)

The formation of coatings with high hardness, toughness, wear- and corrosion-resistance, suitable for applications in the area of medicine (anti-corrosion and wear-resistance coatings of different medical instruments, artificial joints and implants) and machine engineering (protective coatings on cutting, forming and petal processing instruments and bearings) are problems of great importance nowadays. TiN/ZrN multilayer coating system is a hard, wear resistant material which is widely used for cutting and forming tools and other components operating in an abrasive wear environment.
In this study TiN/ZrN multilayer coatings was deposited on tool steel by direct current magnetron sputtering. The experiments were conducted on samples of W320 (0.31 wt% C; 0.30 wt% Si; 0.35 wt% Mn; 2.9 wt% Cr; 2,8 wt% Mo; 0.5 wt% V) hot-work tool steel that were heat-treated in advance.
The structure of the coatings was observed by XRD (X-ray diffraction) with CuKα characteristic radiation (1.54 Å). The measurements were conducted in Bragg-Brentano (B-B) symmetrical mode, from 20° to 80° at 2θ scale. The step has been chosen 0.1° with counting time 10 sec. per step. The microstructure of the obtained multilayer coatings was investigated by Scanning Electron Microscopy (SEM), as backscattered electrons have been used. The accelerated voltage was 20 kV. The chemical composition was studied by Energy-Dispersive X-ray Spectroscopy (EDX). The surface of the coatings was observed by Atomic Forced Microscopy (ATM). Nanoindenter tester (Brucker, USA) was used to measure the nanohardness and Young's modulus.
The obtained results demonstrate the possibility of formation of hard and wear resistant multilayer coating of TiN/ZrN on the tool steels. It was shown the opportunity of formation of surface coatings with good stoichiometry and great mechanical properties with the chosen technological parameters, applied during the deposition.

Author: Prof. PETROV, Petar (Institute of Electronics, Bulgarian Academy of Sciences)

Co-authors: Mrs ORMANOVA, Maria (Institute of Electronics); Dr BEZDUCHNYI, Ruslan (Department of Solid State Physics and Microelectronics, Faculty of Physics, Sofia University "St. Kliment Ohridski"); Mr DECHEV, Dimatar (Institute of Electronicsq Bulgarian Academy of Sciences)

Presenter: Prof. PETROV, Petar (Institute of Electronics, Bulgarian Academy of Sciences)

Session Classification: Poster Session Wednesday

Track Classification: Thin Film & Surface Engineering