

OR0704

Low friction CrN/TiN multilayer coatingsJörg Paulitsch¹, Christian Maringer², Paul H. Mayrhofer²¹Montanuniversität, Leoben, Austria ²Department of Physical Metallurgy and Materials Testing, Montanuniversität, Leoben, Austria

jup23@gmx.at

CrN and TiN coatings are known for their high hardness and good wear resistance and therefore, these hard coatings are used for a wide range of industrial applications. Consequently, many researches still concentrate to further improve these already well investigated coatings.

Recently we showed that multilayered CrN/TiN coatings deposited with a hybrid HIPIMS/DCMS deposition technique results in friction coefficients μ of about 0.1. Here, we present results on structure, mechanical and tribological properties of multilayered CrN/TiN coatings as a function of the bilayer period. Investigations on the morphology and microstructure are conducted by scanning and transmission electron microscopy and X-ray diffraction exhibiting dense structure and a preferred (200) crystallographic orientation. The coatings exhibit hardness values around 23 GPa, obtained by a UMIS nanoindenter, and sliding wear coefficients of around $3 \cdot 10^{-16} \text{ m}^3/\text{Nm}$, obtained by optical profilometry after ball on disk tribometer tests, to be nearly independent of their bilayer period. Contrary to these findings the friction coefficients μ vary between 0.1 and 0.6 depending on the used bilayer period.

The results clearly demonstrate the advantage of the CrN/TiN multilayer system due to high hardness values, excellent wear resistance and the possibility of adjusting application oriented friction coefficients.

Keywords

CrN

TiN

low friction

bilayer period

multilayer