

PO2009

Study of Multilayer CrN/MoN Thin Films Deposited by Reactive Magnetron Sputtering

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Many experimental results clearly demonstrate that the nanocrystalline and nanophase materials, which are composed of small (≤ 10 nm) grains, exhibit enhanced mechanical, tribological, physical, optical, magnetic and electrochemical properties. Nanoscale size of bilayer in multilayer coatings increase these features and give new effects.

The paper is dedicated to research of multilayer coatings based on metal nitrides CrN and MoN. The multilayer thin films were deposited by reactive magnetron sputtering from Cr and Mo targets in argon-nitrogen atmosphere. Films with various period thickness (bilayer) were produced: 5, 8, 12, 18, 24 and 48 nm. The total thickness of each multilayer thin film is from 300 up to 600 nm. Single layer samples were also fabricated.

The morphology of studied films and their cross-section samples were studied by scanning electron microscopy (SEM). Elemental composition and rates were measured by Energy-Dispersive X-ray Spectroscopy (EDS) and Wavelength-Dispersive X-Ray Spectroscopy (WDS). Structural-phase analysis was performed using X-ray Diffraction Analysis (XRD), X-ray reflectometry (XRR) and Electron Backscatter Diffraction (EBSD). The relation between bilayer thickness, deposition conditions, structural and mechanical properties will be investigated.

Keywords

Multilayer

Nitrides

Bilayer

Magnetron Sputtering

Adhesion