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Enhanced wear resistance of molybdenum nitride coatings deposited by high power impulse magnetron sputtering by using micropatterned surfaces

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Abstract

Molybdenum nitride films have been prepared by high power impulse magnetron sputtering (HiPIMS). Using this particular process it was possible to produce coatings with different stoichiometry and structure morphology exhibiting excellent tribological properties. Mo-N phase analysis was performed by X-ray diffraction (XRD). The chemical composition and surface topography were measured by wavelength-dispersive X-ray spectroscopy (WDS), scanning electron microscopy (SEM), focused-ion-beam (FIB) cross-sectioning together with energy dispersive X-ray spectroscopy (EDX) mapping, stylus profilometry and white-light interferometry, respectively. In a second step the wear-resistant films are deposited on microengineered substrates. The used substrate surfaces before coating were prepared by either micro-embossing using diamond stamps or laser sculpturing. The mechanical properties adhesion, nanohardness, elastic modulus and tribological behavior were acquired and the in-

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