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Comparative microstructure, chemical composition, optical and tribo-mechanical properties of CrAlN coatings deposited by HiPIMS and DC magnetron sputtering

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Chromium aluminium nitride films by magnetron sputtering develop an excellent high temperature protection behaviour and tribo-mechanical properties. In this work, different coatings based on Cr(AI)N are deposited by D.C. reactive magnetron sputtering and HiPIMS reactive magnetron sputtering on silicon and steel substrates. The optical properties like emissivity are measured at room temperature by mean of FTIR spectrometer with values of ϵ higher of 85%. The microstructure and chemical composition of the coatings are studied by mean of scanning electron microscopy (SEM), transmission electron microscopy (TEM), energy dispersive spectroscopy (EDS) and electron energy loss spectroscopy (EELS) looking for differences induced by the high ionization plasma in the case of the HiPIMS. In order to increase the knowledge about the consequences of this chemical and microstructural differences, mechanical and tribological properties of coatings prepared by both techniques (DC and HiPIMS) are measured and compared.

Keywords

CrAlN

HiPIMS

Emissivity

Tribology

EELS