

Study of Cr/Ti Based Nitride Multicomponent Coatings Deposited Using Cathodic Arc Deposition

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Abstract

Cathodic arc deposition technique especially allows the deposition of a broad spectrum of materials, particularly covering the nitrides and carbides of the transition metals. In the present study, Multicomponent coatings of transition metal nitrides such as CrN, Cr-CrN, TiN-CrN & TiN- M-CrN films were deposited by Cathodic arc deposition technique on Mirror polished stainless steel (SS 316-L) coupons. These coating were deposited with highest thickness of ~2 to 3 micron. Multicomponent coatings have been widely used in cutting tools and machinery industries because of the superior chemical, physical, and mechanical properties, such as high hardness, wear resistance, adhesion and corrosion resistance as well as their chemical stability. Furthermore, optical properties of these coatings have been further studied because of the possible applications of these coatings in solar cells and plasmonics.

The X-ray diffraction (XRD) was performed to identify the phases, preferred orientation, and crystallite size of the coatings to avoid interference by the substrate and to obtain structural information of the coatings. The EDAX cross-section view of the thin films was studied by scanning electron microscope (SEM), Adhesion Test, Wear Measurement and corrosion resistance of the coatings was evaluated. The results clearly show that multicomponent coating combination reveal improved tribological properties as compared to mono-layer coatings

Keywords: *Cathodic arc deposition technique, Multicomponent coatings, Tribological properties*