عنوان مقاله:

Comparison of Properties of Ti/TiN/TiCN/TiAlN Film Deposited by Cathodic Arc Physical Vapor and Plasma-assisted Chemical Vapor Deposition on Custom 450 Steel Substrates

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خلاصه مقاله:

This study investigated the effects of deposition techniques on the microstructural and tribologicalproperties of Ti/TiN/TiCN/TiAlN multilayer coatings onto a Custom 450 steel substrate. The coatingswere produced using cathodic arc physical vapor deposition (CAPVD) and plasma-assisted chemicalvapor deposition (PACVD). The microstructural of the coatings was evaluated using (SEM), and phaseformation was analyzed by (XRD). The mechanical properties of the coatings were examined by nanoindentationtesting machine. Erosion behavior was studied using an erosion tester and theelectrochemical behavior of the deposited films in 3.5% (wt) NaCl solution was investigated usingpotentiodynamic polarization. XRD analysis indicated that TiN, TiCN, and TiAlN featured differentchemical compositions in each coating. Nano-indentation showed that the hardness of the CAPVDcoating was 23.35 GPa and of the PACVD coating was 12.92 GPa. The coefficient of friction was 0.22for the CAPVD and 0.17 for the PACVD coatings. Erosion testing was conducted using two abrasivepowders at impact angles of 30° and 90°. The results showed that erosion rate at an impingement angleof 90° was greater than at 30° and the CAPVD coating showed better performance. Thepotentiodynamic polarization curves showed that the CAPVD coating provided better corrosionresistance than the PACVD coating.

کلمات کلیدی:

Ti/TiN/TiCN/TiAlN CoatingTribologyCathodic Arc Physical Vapor DepositionPlasma Assisted Chemical Vapor DepositionC450 Steel

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