Corrosion behavior of multilayer coatings deposited by PVD on Inconel 718 in Chloride and Sulphuric Acid solutions

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The corrosion behavior of multilayer AlCrN/TiSi, AlCrN/TiCrSiN and AlCrN/AlCr + Cr coatings deposited by physical vapor deposition (PVD) technique was investigated. Electrochemical techniques such as linear polarization resistance (RPL) and potentiodynamic polarization (PP) were used to study the corrosion behavior performance of the multilayers PVD coatings. After electrochemical testing, the coating surface morphology was analysed by scanning electron microscopy (SEM) and the atomic composition by energy dispersive X-ray spectroscopy (EDS). The results of the corrosion potential indicated that there was no pattern of the behavior corrosive of the coatings in NaCl and H₂SO₄ test solutions. The corrosion rates of the different systems are in the range between 1E-3 mm/year and 1E-2 mm/year in NaCl and H₂SO₄ test solutions, respectively. Some coatings showed tendency to the pseudo passivation behavior in the different electrolytes with a positive hysteresis, which indicative of localized corrosion. For H₂SO₄ the most stable coating was for AlCrN/TiSi. PVD coatings present the highest corrosion rate in H₂SO₄, and both AlCrN/TiSi and AlCrN/AlCr + Cr present corrosion localized. AlCrN/AlCrN+CrN coating has lower pitting corrosion resistance

Keywords: Corrosion, PVD, Inconel 718, multi-layer coatings.

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