

Abstract

Transition metal nitride based hard coatings such as TiN, TiAlN are chemically inert, thermally stable and, therefore, provide good corrosion protection. Deposition of hard coatings on material surface by reactive r.f magnetron sputtering methods features one of the most intensely developed directions of improvement of the working properties of materials. The PVD techniques are widely used nowadays for improvement of the corrosion resistance. One of the general reasons for depositing by PVD techniques is developing the protective coating presenting corrosion resistance higher than the substrate. Titanium-aluminium nitrides were successfully prepared by reactive r. f magnetron sputtering method, on XC48 steel substrates. Optical microscopy (OM) was used to study the structure morphology. Potentiodynamic polarisation test and electrochemical impedance spectroscopy (EIS) measurements were conducted in an aerated (3.5% weight) NaCl aqueous solution at room temperature. The results of electrochemical tests indicated that a TiAlN coating showed the best corrosion resistance with the lowest corrosion current density in (3.5% weight) NaCl solution. Finally, it was found that TiAlN coatings increased the corrosion potential and decreased significantly its corrosion current density of the XC48 steel substrate in 3.5% NaCl solution at room temperature.