

A B S T R A C T

The aim of this study is to investigate the influence of plasma deposition parameters (the pressure and the substrate bias voltage V_s) on structure, surface morphology, hardness and electrochemical behavior (studied by potentiodynamic polarization and optical microscope (OM) in aggressive environment NaCl 3.5 wt%) of TiAlN coatings. The coatings were deposited by reactive RF magnetron sputtering (13.56 MHz). They were carried out during 60 min and their thickness was approximately 1 μ m. Structural analysis shown that TiAlN coating crystallized in cubic (fcc) and hexagonal (hcp) structure with orientations in (1 0 0), (1 1 1), (2 0 0), (1 1 0), (2 2 0) and (3 1 1) planes. The deposited coatings present maximum hardness ($H = 25.75$ GPa) and Young's modulus ($E = 479.82$ GPa) at low pressure (20 mTorr) and -60 V of negative substrate bias. Also, mechanical properties (H&E) were strongly influenced by coatings density and grain size. Electrochemical tests revealed that XC48 steel substrate covered with TiAlN coating exhibit excellent corrosion resistance.