

Corrosion behavior of AISI 316L coated with Ti-TiN by vacuum arc deposition

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Ti-TiN bilayer coatings on stainless steel have been proposed to improve not only hardness but also corrosion resistance. In this work the corrosion behavior of nitride AISI 316L samples coated with Ti-TiN employing a vacuum arc is presented, corrosion results obtained from only nitrided and non-treated samples are compared.

The samples were DC plasma nitrided at 430°C with 24% nitrogen partial pressure and hydrogen. After that, they were coated by means of a DC cathodic arc running 125 A current discharge. The samples were placed 30 cm away from the cathode surface and one group of samples was grounded and another one was connected to 6kV negative bias voltage. TiN films were obtained employing a continuous nitrogen flux of about 35 sccm and a working pressure in the range of $1-3 \cdot 10^{-2}$ Pa. The structural properties have been characterized by means of an optical microscope, scanning electron microscopy (SEM) and X ray diffraction (XRD). The coatings adhesion was assessed by means of Scratch Test and Rockwell C indentation. The corrosion behaviour was evaluated etching the samples with Marble reagent and by means of anodic polarization tests in NaCl solution.

The Ti and the TiN peaks can be distinguished in the XRD patterns of the coated samples, meanwhile, the XRD patterns of the nitrided samples showed the expanded austenite phase, the SEM images showed the presence of macroparticles in the layer structure and the film thickness was about 1µm. All coated samples resisted the marble reagent attack and in the polarization experiment, the duplex coated samples presented the best behaviour.

References

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