

## **Microstructure and wear behavior of TiN coatings deposited on nitrided stainless steel by PBII&D**

L. S. Vaca<sup>1</sup>, J. P. Quintana<sup>2</sup>, Daniel Vega<sup>3</sup>, M. Moscatelli<sup>1</sup>, E. L. Dalibon<sup>1</sup>, S. P. Brühl<sup>1</sup> and A. Márquez<sup>2</sup>

<sup>1</sup>*Grupo de Ingeniería de Superficies, UTN-FRCU*, <sup>2</sup>*Instituto de Física del Plasma, CONICET-UBA*, <sup>3</sup>*Grupo Física de la Materia Condensada, GIyA, CNEA*  
e-mail: [laurasvaca@gmail.com](mailto:laurasvaca@gmail.com)

This work presents the wear behavior of TiN coatings obtained by cathodic arc discharge combined with implantation and temperature on AISI 316L stainless steel previously ion nitrided.

Ion nitriding was performed in an experimental equipment by a pulsed DC discharge at 24% of nitrogen, during 6 hours at 400 °C of temperature.

The PVD TiN coatings were obtained in a plasma generated by a vacuum arc of 100 A between a pure Ti cathode and the anode. The samples were placed 23 cm away the cathode surface and were connected to 6 kV negative pulsed bias voltage and heating the substrate at 300 °C.

The structural properties have been characterized by means of a scanning electron microscopy and X ray diffraction. The coatings adhesion was evaluated by adhesive type test, scratch test with constant loading and Rockwell C indentation. The wear resistance was determined by the pin-on-disk test and the chemical inertness was evaluated by means of the passivation test according ASTM standard A967 (Drop of CuSO<sub>4</sub> solution) and by salt fog test during 100 hours.

The characteristic 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 coatings thickness varied between 1,5 µm to 2,5 µm, the SEM images showed the presence of macroparticles in the layer. All the coated samples showed chemical inertness and better adhesion and wear behavior than the coatings obtained without implantation.

Key words: TiN coatings, stainless steel, PBII&D