

PO3062

**Structural and tribological properties of fluorinated-hydrogenated amorphous carbon films deposited on stainless steel**

Erika Ochoa<sup>1</sup>, D.P.A. Holgado<sup>2</sup>, L. Nanchez<sup>3</sup>, D.F. Franceschini<sup>3</sup>, F. Alvarez<sup>4</sup>,  
F.L. Freire Jr.<sup>2</sup>, M.E.H. Maia da Costa<sup>2</sup>

<sup>1</sup>Departamento de Física - PUC-Rio, Rio de Janeiro, Brazil <sup>2</sup>Departamento de Física, Puc-Rio, Rio de Janeiro, Brazil <sup>3</sup>Instituto de Física, UFF, Niterói, Brazil <sup>4</sup> Instituto de Física, Unicamp, Campinas, Brazil

erika.ochoa@vdg.fis.puc-rio.br

In this study we reported the physical properties of the a-C:F:H film deposited by rf-PECVD on stainless steel substrate (ISO306L). The a-C:F:H films are well-known by both the low surface energy and low friction coefficient. However, the main problem facing this coating is the internal stress and the low film adhesion. The presence of fluorine in the carbon network reduces the internal stress, but it is not enough to prevent the film delamination. To overcome these problems and improve the film adhesion we have used an intermediate titanium coating deposited on a previously nitrided substrate. The nitriding processing was performed in a pulsed industrial hot wall commercial furnace (Plasma LIITS, Campinas, Brazil). Key properties such as the morphology, microstructure, as well as tribological and mechanical properties of the carbon films are reported. A multitechnique approach was employed. In this way, atomic force microscopy, Raman spectroscopy, SEM, XPS, nanoindentation, and tribometer tests were used for a comprehensive picture of the physical properties of the coating. It was shown that it has a low friction coefficient compared with the steel substrate. Hardness of the order of 11 GPa was obtained for the coated surfaces. The experimental results show a considerable improvement of the film adhesion by the presence of the titanium layer.

**Keywords**

316 stainless steel

Nitriding

a-C:F:H

rf-PECVD

Tribology