Effects of pressure and substrate temperature in the deposition of ZrN thin films deposited by DC magnetron sputtering

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The aim of this work is to produce and study the mechanical properties of ZrN thin films over Si and Ti substrate. Specifically, we want to study the crystalline structure and the surface homogeneity and investigate the electrochemical properties to increase the corrosion resistance of the surface.

The ZrN thin films were deposited in different substrates using PVD - reactive magnetron sputtering. The influence of nitrogen partial pressure, the substrate temperature and the depositing time was studied.

The thin films were characterized by Rutherford Backscattering Spectroscopy, X-Ray Photoelectron Spectroscopy, X-Ray Diffraction, Scanning Electron Microscopy, Nanohardness and Potentiodynamic Polarization.

The ZrN thin films property varies with the deposition parameters. The thin film thickness increases when deposited with low nitrogen partial pressure. The corrosion resistance is better when using elevated deposition temperature. These results is associated with variations in crystalline structure and in the chemical bonds between the Zr and N. For all the treatment conditions, the electrochemical measurements show an improvement in corrosion resistance on the Ti deposited with ZrN coating.

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