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**Influence of plasma-based ion implantation and deposition on the structure, internal stress and mechanical properties of nanocrystalline ZrN coatings**

ABSTRACT. Nanocrystalline films of zirconium nitride have been synthesized using the plasma-based ion implantation and deposition (PBIID) technique on AISI 430 stainless steel at low substrate temperature. Structural, chemical and mechanical examination—using X-ray diffraction (XRD), scanning electron microscopy (SEM) with microanalysis (EDX) and nanoindentation—was undertaken to elucidate phase and chemical composition, surface morphology, microstructure and nanohardness of the ZrN coatings. The stressed state was studied by X-ray tensometry ( $a - \sin^2\psi$  method) and its modified variants applied to condensates with a strong axial texture. The maximal nanohardness was 44 GPa with elastic modulus of 506 GPa. Some examples of medical instruments coated with ZrN are presented.

**Keywords:** coating, structure, vacuum-arc deposition, zirconium nitride

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