

Study of the newly synthesized NEG's of Ti-Al-Zr with enhanced performance for ultra-high vacuum generation

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Abstract

The non-evaporable getter (NEG) thin films of Ti-Al-Zr and Ti-Zr were prepared on stainless steel substrate for high vacuum application by cathodic arc deposition technique. The Scanning electron microscope (SEM), energy-dispersive x-ray spectroscopy (EDX), x-ray diffraction (XRD), and in-situ x-ray photoelectron spectroscopy (XPS) were used to analyse the getter behavior of the NEG thin films. SEM images showed the porous and rough surfaces of the thin films, which is indication of high adsorption and sticking probabilities of residual gases present in the chamber. The volume elemental composition of thin films was measured by EDX. XRD patterns of synthesized thin films displayed the amorphous nature and high structural stability. The in-situ XPS studies revealed that the superficial layers had disappeared by heating at < 250°C for 30 minutes for NEG Ti-Al-Zr thin films, results in activation the surface, whereas for Ti-Zr thin films, no reasonable activation was observed at 250°C. The results of this study revealed that the thin films of Ti-Al-Zr are good candidate to reduce the outgassing and to produce ultra-high vacuum.

Key words:

UHV, NEG, Cathodic arc, XPS