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Determination of pumping properties of Quaternary alloy of TiZrVAl non evaporable getter

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In recent years, the non-evaporable getter (NEG) thin film coating technology, have been developed for LHC project in 90s, is extensively used on world's accelerator vacuum chambers, especially in ultralow emittance storage rings and in small gap insertion device vacuum chambers. The main advantages of using NEG coatings are distributed pumping speed, low thermal outgassing, low photon-stimulated gas desorption and low electron-stimulated gas desorption (ESD) without any effect on machine aperture.

The ASTeC Vacuum Science Group has had an ongoing study for the improvement of the non-evaporable getter (NEG) coating technology. Alike our earlier results, a new quaternary TiZrHfV coating, demonstrates better key parameters, such as lowest activation parameters, higher sticking probability and higher pumping capacity than usual ternary TiZrV coating.
In this study, we report on the pumping properties, activation temperature, sticking probability (H, Co, CO2) of new NEG quaternary alloy of TiVZrAl as function of the film structure, morphology, and composition.
Film bulk composition was determined using Rutherford Back Scattering RBS while the surface composition and surface chemical state as function of activation temperature was determined with X-ray photoelectron spectroscopy XPS. Surface structure and its morphology was determined by Scanning electron Microscope and X-ray diffraction.

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