



Contribution ID: 1253

Type: **not specified**

P3.206 Characterization of ZAO® sintered getter material for use in fusion applications

Wednesday, 19 September 2018 11:00 (2 hours)

The use of non-evaporable getter (NEG) pumps is common in many UHV applications including surface science, analytical instruments and very large vacuum systems for high energy physics. In the past years, getter solutions based on the new sintered alloy ZAO® have been developed enabling operation in the HV regime, i.e. 10⁻⁶ Pa and above. The properties of this NEG material make it appealing for applications dealing with large fluxes of hydrogen and its isotopes, as typically occurs in fusion research. In particular, the use of NEG pumps is interesting for the vacuum system of negative ion-based neutral beam injectors, commonly used in fusion devices for plasma heating, which require a huge deuterium gas throughput to sustain a dynamic equilibrium between low-pressure beam drift regions and a relatively high-pressure neutralizer cell. The key advantages of a NEG pumping solution for hydrogenic species are the high specific pumping speed and capacity, the robustness, intended as ability to withstand a large number of adsorption/desorption cycles with unchanged pumping properties, the ease of integration. In addition, NEG do not release hydrogen unless power is supplied to heat them; this property allows to control the rate of hydrogen release during regeneration, i.e. H₂/D₂ extraction, but also addresses an important safety issue related to uncontrolled release in case of power outage or subsystem failures.

In this paper we report the experimental characterization of ZAO® sintered getters, in pressure regimes and sorption amounts relevant for the use in the next generation NBI. Discs and pumps were characterized in different conditions of pressure between 10⁻⁴ and 10⁻¹ Pa and operating temperatures up to 150°C, with respect to the equilibrium isotherms, adsorption and desorption of H₂/D₂ and cyclic embrittlement limit. In particular, the feasibility of getter regeneration within time windows acceptable for a high-availability NBI system was demonstrated.

Presenter: Dr SIVIERO, Fabrizio (Solutions for Vacuum Systems Development Lab SAES Getters S.p.A.)

Session Classification: P3