

UHV-ERDA investigation of NEG coatings

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Non-evaporable getter (NEG) coatings are widely used in large vacuum systems such as particle accelerators. Since NEG coatings produced at the GSI Helmholtzzentrum für Schwerionenforschung have a finite thickness of typically 1 μm , ion beam analysis techniques such as ERDA and RBS are the methods of choice to study element and depth-resolved evolution of the getter film during gas pumping. The film thickness and stoichiometry can be determined by RBS while ERDA is sensitive to lighter elements such as carbon, nitrogen and oxygen, the main residual gas components of a vacuum environment. In this work we first present exsitu and insitu measurements of NEG thin films using ERDA. For the investigation of the pumping speed and capability of the getter films, we have used a vacuum test chamber where getter coated samples can be activated and saturated in a very controlled way. Afterwards, depth distributions of the pumped gas components have been measured using ERDA. To study the gas components in NEG coatings online, i.e., during activation or pumping, we have set up an ERDA system working at vacuum pressures down to 10^{-11} mbar. A special target heater system allows to activate the getter coatings insitu at typical temperatures between 180 and 300 °C in a UHV environment with tolerable influence to the total and partial gas pressure. With this UHV-ERDA setup, a temperature dependent diffusion process of gas components into the getter material could be analyzed for the first time.