

ERDA investigations on NEG ageing

M. Wengenroth, M.C. Bellachioma, M. Bender, H. Kollmus, H. Reich-Sprenger

Abstract

Non evaporable getter (NEG) Ti-Zr-V coatings have been introduced in the heavy ion synchrotron SIS18 at the GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, during recent vacuum upgrades to optimize the UHV conditions in the accelerator. In order to characterize the NEG thin films produced at GSI, UHV Elastic Recoil Detection Analysis (ERDA) is one of the quality controls. ERDA is an ideal tool to measure element specific depth distributions with an investigation depth of typically 1 μm . This allows measuring the depth distribution and concentration of the getter components but also of the pumped gas within the whole film.

Since the vacuum coated chambers mounted in accelerators undergo different gas loads depending on the place of installation and several venting-activation cycles, a deep investigation on the NEG ageing was initiated using the ERDA technique. Actually after venting the NEG surface is passivated. In order to regenerate it, a thermal activation cycle is needed. For each heating cycle a quantity of oxygen is dissolved into the getter. The maximum possible number of cycles is reached when the oxygen solubility limit is reached.

The ERDA technique allows monitoring the NEG ageing, to forecast the number of reactivation and to determine the lifetime capacity. Therefore, small NEG samples coated together with the vacuum chambers were placed inside the accelerator vacuum system. During maintenance these samples can be retrieved and analyzed using ERDA and the remaining live time of the installed chambers can be predicted.