Energy scaling of the ion-induced desorption yield for perpendicular collisions of Ar and U with stainless steel in the energy range of 5 and 100 MeV/u

Kollmus H, Krämer A, Bender M, Bellachioma MC, Reich-Sprenger H, Mahner E, Hedlund E, Westerberg L, Malyshev OB, Leandersson M, Edqvist E
Journal of Vacuum Science & Technology A: Vacuum, Surfaces and Films (March 2009) Volume 27 Issue 2 Pages 245-247

For the GSI future project Facility for Antiproton and Ion Research a beam intensity of 10^{12} U^{28+}ions/s is planned to be extracted from the GSI heavy ion synchrotron SIS18. Measurements performed in 2001 showed that the beam lifetime of the ions in the synchrotron is decreasing with increasing number of injected particles due to vacuum instabilities caused by ion-induced desorption. The injection energy for the SIS18 is about 10 MeV/u and U^{28+} ions are accelerated to 200 MeV/u limited by the magnetic rigidity for the low charge state. The aim of this work was to measure the desorption yield as a function of the impact energy from injection to extraction of SIS18 at GSI. Low energy yields at 5.0, 9.7, and 17.7 MeV/u were measured at the Cyclotron of The Svedberg Laboratory in Uppsala. High energy yields at 40, 80, and 100 MeV/u were measured at SIS18 of GSI in a different setup. It was found that the desorption yield scales with the electronic energy loss $(dE/dx)_{el}^{n}$, with n between 2 and 3, decreasing for increasing impact energy above the Bragg maximum.