Ar ion induced desorption yields at the energies 5–17.7 MeV/u

Hedlund E, Westerberg L, Malyshev OB, Edqvist E, Leandersson, MH, Kollmus. Bellachioma MC, Bender M, Krämer A, Reich-Sprenger H, Zajec B, Krasnov A
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Particle accelerator shave, during operation with heavy ion beams, shown a significant pressure rise when the intensity of the beam is increased. This pressure rise is due to ion induced desorption, which is the result of beam ions colliding with residual gas atoms in the beam pipe, where they undergo charge exchange. This causes them to hit the vacuum chamber after the next dipole magnet and gas to be released. For the upgrade of the SIS18 synchrotron at GSI the intensity has to be a few orders of magnitude higher than it is today at the injection energy of 10MeV/u. The aim of this experiment is to measure desorption yields, η, (released molecules per incident ion) from materials commonly used in accelerators: 316LN stainless steel, Cu, etched Cu, gold coated Cu and Ta, using an Ar beam at impact energies in the range of 5–17.7MeV/u for perpendicular incidence. The measured initial desorption yields vary for the same material from sample to sample: up to 4.5 times for stainless steel and up to 3 times for etched Cu. Therefore more samples should be studied to have better statistics. Beam conditioning at lower energy does not significantly reduce the desorption yield at higher energy. There is a significant difference of up to a few times in desorption yield between flat and tubular samples. The desorption yield from a Cu sample at grazing incident angle of 125 mrad was an order of magnitude larger than at normal incident angle. It was found that the total number of positively and negatively charged secondary particles, emitted from the surface bombarded with heavy ions, does not exceed ~40 secondary particles per impact heavy ion. The current of negatively charged particles was about 2.3 times larger than the current for positively charged particles. The impact from secondary particles on dynamic gas pressure was not possible to investigate.