Contribution ID: **33** Type: **Oral**

Time-of-flight Secondary Neutral & Ion Mass Spectrometry using swift Heavy Ions

Wednesday, 20 May 2015 11:00 (20 minutes)

We report on a new time-of-flight (TOF) spectrometer designed to investigate sputtering phenomena induced by swift heavy ions in the electronic stopping regime. In this experiment, particular emphasis is put on the detection of secondary ions along with their emitted neutral counterparts in order to examine the ionization efficiency of the sputtered material. For the detection of neutral species, the system is equipped with a pulsed VUV laser for post-ionization of sputtered neutral atoms and molecules via single photon ionization at a wavelength of 157 nm (corresponding to 7.9 eV photon energy. For alignment purposes and in order to facilitate comparison to nuclear sputtering conditions, the system also includes a 5-keV Ar+ ion beam directed to the same sample area. The instrument has been added to the GSI M-branch beam line and was tested with 4.8 MeV/u Au26+ ions impinging onto various samples including metals, salts and organic films. It is found that secondary ion and neutral spectra obtained under both bombardment conditions can be acquired in an interleaved manner throughout a single accelerator pulse, thus making efficient use of valuable beam time. In addition, the keV ion beam can be intermittently switched to dc mode between subsequent accelerator pulses in order to ensure reproducible surface conditions by dynamical sputter cleaning. For the case of a clean metal surface, comparison of secondary ion and neutral signals obtained under otherwise identical instrumental conditions reveal that the ionization probability of atoms emitted under electronic and nuclear sputtering conditions is similar.

Primary author: Mr BREUER, Lars (Universität Duisburg-Essen)

Co-authors: Prof. WUCHER, Andreas (Universität Duisburg-Essen); Mr MEINERZHAGEN, Florian (Universität Duisburg-Essen)

Presenter: Prof. WUCHER, Andreas (Universität Duisburg-Essen)

Session Classification: Session 9

Track Classification: 02 - Sputtering + Desorption