Contribution ID: **152** Type: **not specified**

The use of a new method - ToF-SIMS in the characterization of fusion materials and HLW glasses

Wednesday, 9 October 2019 18:00 (1 hour)

Abstract: Time-of-flight secondary ion mass spectrometry (ToF-SIMS) is a very important tool in the characterization of various materials, but the use of ToF-SIMS in nuclear field is still not fully developed. In this work, we introduce several studies focusing on the spectra, depth profiles and elemental images of the nuclear fusion materials using ToF-SIMS. In the first part, Hydrogen (H) depth profiles in tungsten (W), which is an important plasma facing material (PFM) in fusion reactors, were ideally provided by ToF-SIMS. The result indicates an obvious increase of H with an implantation fluence of 1×1020 H+/cm2. Moreover, H shows a totally different behavior in the He+ and Au+-damaged samples. The distribution is greatly dependent on the implanting range of the damaged ions. In the second part, deuterium (D), W and titanium (Ti) depth profiles were mainly concerned in zirconium deuteride (ZrDx) layers. However, due to the extremely low concentration, W was not detected by ToF-SIMS. On the other hand, nuclear reaction analysis (NRA) and elastic recoil detection analysis (ERDA) could detect obvious W signals on the surface. These two methods were also used for the quantitative analysis. The third part is the study of light elements in the radioactive wastes. Elemental imaging was provided on irradiated glass-ceramics. The result indicates an obvious migration of important ions such as boron (B), sodium (Na), aluminum (Al) and titanium (Ti) with good spatial resolutions. Above studies are very fundamental trials but show great potentials of ToF-SIMS in the study of nuclear field. ToF-SIMS has its disadvantages but can be well used as a main or supplemental tool with other techniques. Additionally, we have observed an strange change of the sputtering rates during the analysis on a carbon (C) ion-implanted SiC sample. The reasons were also discussed here.

Abstract Type

Poster

Primary author: 张, 建东 (Nanjing University of Aeronautics and Astronautics)

Co-authors: Prof. WANG, Tieshan (Lanzhou University); Prof. JIA, Wenbao (Nanjing University of Aeronautics and Astronautics)

Presenter: 张, 建东 (Nanjing University of Aeronautics and Astronautics)

Session Classification: S5: Poster 分会场

Track Classification: S5 分会场：Poster