Contribution ID: **136** Type: **Poster**

Pulse-resolved measurements of material migration in the JET-ILW divertor by quartz crystal microbalance

Thursday, 20 October 2016 14:00 (4h 45m)

Plasma-wall interaction in fusion devices results in material erosion of the first wall, its migration and deposition. According to the present knowledge, tritium contained in the co-deposited layers is responsible for the major part of the in-vessel tritium inventory.
A set of quartz crystal microbalance (QMB) was used at JET with full carbon wall to monitor material erosion/deposition rates in the remote areas of the divertor. After installation of the ITER-like wall in JET (JET-ILW) with beryllium main wall and tungsten divertor, a strong (factor ~10) reduction of the material deposition and accompanied fuel retention was observed. Therefore the existing QMB electronics have been modified to improve the accuracy of frequency measurements by a factor of ten down to 0.1 Hz (areal mass change about 1.5 ng/cm2). Four QMB sensors with gold electrodes equipped with shutters and reference quartz crystals (for reduction of temperature effects) were installed at the entrance to the louver behind the lower vertical targets of the inner and outer divertor. These remote areas are accessible by neutral particles only. The currently available data of JET-ILW show that under most conditions studied, QMB data indicate net erosion. This is in contradiction with post-mortem analysis of nonoperational QMB crystals at the inner louvre from the first JET-ILW campaign showing net layer deposition. In addition, former QMB measurements in JET-C with full carbon wall and ERO modelling for JET-C and also JET-ILW show a clear dependence of QMB mass change regimes from the strike point position with largest deposition measured on the inner QMB when the inner strike point is located at the corner. In contrast, the current measurements show largest erosion at the inner QMBs when the inner strike point is located at the corner. One possible explanation for the net erosion signals of the QMBs could be that the total mass balance is still dominated by the erosion of the initially clean gold electrodes due to fast neutrals. The fast neutrals responsible for the erosion could be produced due to the reflection of high energetic D and/or Be ions from the target plates. An additional explanation for the erosion signals could be the change of the quartz resonance frequency due to stress caused by beryllium deposits.

Paper Number

EX/P6-4

Country or International Organization

Germany

Primary author: Dr SERGIENKO, Gennady (DeIECR)

Co-authors: Dr HUBER, Alexander (DeIECR); Dr KIRSCHNER, Andreas (DeIECR); Dr WIDDOWSON, Anna (UkCCFE); Mr WECKMANN, Armin (SeKTH); Mr AYRES, Charlie (UkCCFE); Dr ESSER, Hans Günter

(DeIECR); Dr HEINOLA, Kalle (FiUHel); Mrs FREISINGER, Michaele (DeIECR); Dr BREZINSEK, Sebastijan (DeIECR)

Presenter: Dr KIRSCHNER, Andreas (DeIECR)

Session Classification: Poster 6

Track Classification: EXS - Magnetic Confinement Experiments: Stability