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P4.126 Deuterium retention on the tungsten-coated divertor tiles of JET ITER-Like Wall in 2015-2016 campaign

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Erosion, deposition, and fuel retention on different plasma-facing components (PFC) are critical issues for next-step fusion devices such as ITER and DEMO. Since 2011, JET has been operated with the ITER-like wall (ILW): tungsten (W) in the divertor and beryllium (Be) in the main chamber. So far there have been three experimental campaigns in 2011-2012 (ILW-1), 2013-2014 (ILW-2) and 2015-2016 (ILW-3). After each campaign, poloidal set of divertor and main chamber tiles were removed for post-mortem analyses. Analyses after the first two campaigns [1] have shown that the fuel retention is reduced by factor of 10-20 compared to the earlier JET operation with an all-carbon wall.
The strike point distribution in the ILW-3 campaign was quite similar to ILW-2 whereas ILW-3 contained more high power plasma discharges than the earlier campaigns. To study deposition and deuterium (D) retention on the divertor, samples from the W-coated divertor tiles exposed in 2015-2016 were measured with Secondary Ion Mass Spectrometry (SIMS). Deuterium implanted samples were used for calibrating the SIMS measurements.
Comparison of ILW-3 results will be made with ILW-1 and ILW-2 results to investigate whether high power discharges have increased the thicknesses of the co-deposited layers and whether they have had an effect on the D retention due to higher absorbed energies. Similar to the earlier campaigns, the thickest deposits are found from the upper inner divertor tiles. After ILW-2, depletion of D was observed at the surface of the tiles due to the hydrogen plasma experiments at the end of ILW-2 [1], whereas ILW-3 ended with D plasmas and D peak is observed at the surface of the samples. Results for the D retention will be presented and compared to Nuclear Reaction Analysis and Thermal Desorption Spectroscopy measurements of ILW-3 samples.

[1] K. Heinola et al. (2017) Phys. Scr. 2017 014063

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