Global distribution of tritium in JET with the ITER-like wall

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Integrated tests of ITER reference wall materials, beryllium (Be) and tungsten (W), have been performed in JET with the ITER-like wall (JET-ILW) during experimental campaigns in 2011-2012, 2013-2014 and 2015-2016. In this study, tritium (T) analyses were performed on the bulk W lamellae and W-coated CFC divertor tiles, Be limiter tiles and dust particles after the three campaigns using various techniques including imaging plate (IP), β-ray induced x-ray spectrometry (BIXS) and thermal desorption spectrometry (TDS). T distributions on the plasma-facing surfaces (PFS), in tile gaps and in the castellation grooves were determined.

The distributions in the divertor region are well correlated with the deposition pattern of Be and other impurities. The divertor tiles at the inboard side have higher T concentrations than those at the outboard side. Differences in strike point distributions in different campaign resulted in diverse tritium deposition patterns. On the PFS of bulk W tile the T concentrations are distinctly lower than those on the W-coated CFC tiles. In addition, small amounts of T have been deposited on the surface in the gap between lamellae.

In the main chamber, the distributions of T on PFSs of Be tiles show no systematic correlation with that of metallic impurities [1] and D [2]. The highest T concentration has been observed at the center of outer poloidal limiter where the concentrations of D and metallic impurities have the minimum values [1,2]. In contrast, gradated distributions of T found inside the castellation grooves are similar to those of metallic impurities and D [3]. These observations suggest T distributions on the PFSs were dominated by implantation of T at high energy, while those at the castellation grooves were controlled by co-deposition.

With regard to dust, total amount of T in dust evaluated by using a combustion method [4] was much smaller after each ILW campaign than after the last carbon wall campaign.

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**See the author list: E. Joffrin, 27th IAEA Fusion Energy Conf., Ahmedabad, India, 2018.*