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An Overview of Erosion-Deposition Pattern in JET with ITER-like Wall

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Since August 2011 the JET tokamak has been operated with the ITER-Like Wall (JET-ILW): beryllium in the main chamber and tungsten in the divertor. i.e. the material configuration decided for ITER. Material erosion and fuel inventory studies are priorities of the JET-ILW programme. A large number of diagnostic tools was developed and installed to elucidate the overall material migration scenario. They are based either on transport tracers (limiter and divertor tiles) or on deposition monitors (wall probes). Following results have been obtained after the first ILW operation. Beryllium limiters and upper dump plates The central part of inner wall limiters in the mid-plane zone was identified as the main erosion area of Be: up to 80 microns. The sides of limiters are covered by deposits up to 50 microns thick. On all types of Be tiles there are regions of shallow melting and arcing. The deuterium content is in the range from 0.02 x10^18 cm^-2 in the eroded to 4.5x10^18 cm^-2 level in the deposits. Divertor The deposition pattern is not uniform. The deposition is found mainly in the inner divertor with maximum at the top of the divertor: Be-rich layers up to 15 □microns thick. Remote areas in the divertor The maximum thickness of deposits does not exceed 1 micron what is nearly three orders of magnitude less than measured in some deposits in JET carbon walls.
Ex-situ analyses of components have shown that the overall fuel inventory in JET-ILW is low, both absolute (below 5x10^18 cm^-2) and relative: Be/D concentration ratio > 10 in thick deposits. The absolute amount of carbon in co-deposits is low. This result is consistent with spectroscopy data. The lack of a major carbon source reduces transport and corresponding fuel accumulation in shadowed areas. No flaking deposits were detected. The amount of dust retrieved during the shut-down was below 2 g. The results clearly indicate a significant reduction of fuel retention and dust formation in a metal-wall machine in comparison to the operation with carbon walls.

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