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Melting of leading edges and surfaces of high-and low-Z plasma facing components in the DIII-D Divertor.[1] D.L. RUDAKOV, I. BYKOV, UCSD, T. ABRAMS, H.Y. GUO, D.M. THOMAS, GA, C.J. LASNIER, A.G. MCLEAN, LLNL, A. LITNOVSKY, FZJ, R.E. NYGREN, J.G. WATKINS, SNL, R.A. PITTS, ITER, S. RATYNSKAIA, P. TOLIAS, KTH — Plasma facing component (PFC) edge and surface melting is a serious concern for ITER as it can cause PFC damage, plasma contamination and dust production. Melting of tungsten leading edges was observed during experiments in the lower divertor of DIII-D. W blocks misaligned by 0.3 mm and 1 mm with respect to the divertor tile level were exposed near the outer strike point during deuterium and helium L- and H-mode discharges using the DiMES manipulator. FIB SEM analysis showed an evidence of W recrystallization under the edges, and formation of cracks up to 100 microns wide was observed. Micro-scale melting was also observed at the toroidal edge of the block raised by 1 mm, indicating the potential importance of finite Larmor radius effects for edge thermal loading. Additional data on leading edge melting were obtained during the Metal Rings Campaign, where W-coated molybdenum inserts in the lower divertor tiles bowed during plasma exposure, forming leading edges. Re-solidified melt layers were observed at the edges, their shape being consistent with motion in jxB direction with j driven by electron emission. Plans for exposure of an aluminum block as a beryllium proxy to benchmark ITER-relevant MEMOS-U modeling of melt layer dynamics will also be presented.

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