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Micro engineered trench targets to capture deuterium ion impact angle distributions on DiMES at DIII-D[1] C.H. SKINNER, PPPL, S. ABE, B. KOEL, PU, I. BYKOV, D. RUDAKOV, UCSD, A. LASA, UTK, J. COBURN, ITER, Y.W. YEH, Rutgers, C.J. LASNIER, A.G. MCLEAN, LLNL, H.Q. WANG, T. ABRAMS, GA — Recent DIII-D DiMES experiments have directly measured material deposition patterns affected by ion shadowing in 30x30x2 or 3 μm deep trenches. These trenches were fabricated via focused ion beam (FIB) milling on a Si surface partially coated with Al to clearly reveal the polar and azimuthal ion impact angle distributions (IADs). The angle of incidence of ions impacting a PFC surface is important in estimating the PFC erosion lifetime as the sputtering yield is highly sensitive to pitch angles below 10-20 degrees. These sample surfaces were exposed to L-mode D discharges for a total of 30 s using the DiMES facility at DIII-D. The areal impurity Al and C concentrations on the trench floors were measured by energy-dispersive X-ray spectroscopy (EDS). Net erosion profiles, calculated by a Monte-Carlo model, Micro-Patterning and Roughness (MPR) code, with input of predicted IADs, reproduced the characteristic shape of the experimental concentration profiles. The measurement revealed that the pitch angle of ions impacting on the surface peaks at 5-10 degrees while ions were entering the sheath region with a pitch angle of 1-2 degrees.

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