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Gross and Net Erosion of Silicon from SiC-coated PFCs in the DIII-D Divertor.[1] D.L. RUDAKOV, I. BYKOV, UCSD, T. ABRAMS, S. BRINGUIER, H.Y. GUO, D.M. THOMAS, GA, R. DING, IPP Hefei, J.D. ELDER, P.C. STANGEBY, UTIAS, A.G. MCLEAN, LLNL, W.R. WAMPLER, J.G. WATKINS, SNL, H. WANG, ORAU, R.S. WILCOX, ORNL — Gross and net erosion rates of silicon from silicon carbide (SiC) coatings were measured in the divertor of DIII-D under well diagnosed reactor-relevant plasma conditions. Amorphous and crystalline SiC coatings on graphite with a thickness of 80 nm and 250 microns, respectively, were exposed near an attached outer strike point of L-mode plasmas using the Divertor Material Evaluation System (DiMES). Plasma density and electron temperature near the center of the coatings were $n_e = 4\text{x}10^{19}\,\text{m}^{-3}$ and $T_e = 23$ eV. Gross erosion of Si from all samples was measured spectroscopically using the Si II 636 nm line. It was found to be a factor of 4 higher for the amorphous coatings compared to the crystalline one, possibly because of the higher surface binding energies in the latter. An average net Si erosion rate of $3\text{x}10^{16}\,\text{cm}^{-2}\text{s}^{-1}$ was measured with Rutherford backscattering on the amorphous coatings with toroidal extent of 1 mm, in good agreement with ERO-OEDGE modeling. Using this rate and corrections from the modeling, an effective SXB coefficient for the Si II 636 nm line of 52 and a Si sputtering yield of 0.017 Si/D were calculated. Compared to previous DiMES measurements of net C erosion from pure carbon coatings at 3 times lower n_e and comparable T_e, the effective reduction of the C erosion rate from SiC is about an order of magnitude. Recently experiments with SiC were repeated at lower n_e; data analysis is in progress.

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