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Erosion and Surface Morphology of Silicon Carbide Under Variable DIII-D Divertor Heat Fluxes[1] STEFAN BRINGUIER, TYLER ABRAMS, HESHAM KHALIFA, DAN THOMAS, LEO HOLLAND, General Atomics, DMITRY RUDAKOV, University of California, San Diego, ALEXIS BRIESEMEISTER, Oak Ridge National Laboratory — A SiC coating of ˜250 μm, deposited onto a graphite DiMES cap via chemical vapor deposition, was exposed to ˜80 s of H-mode plasma bombardment in the DIII-D outer divertor with steady-state heat fluxes up to 3 MW m^{-2} and transient loads due to ELMs typically peaking at ˜10 MW m^{-2}. In-situ monitoring of Si I and Si II atomic spectral lines revealed the presence of significant neutral Si and Si^{+} impurity influx, which are used to determine quantitative erosion rates via the S/XB method. No visual macroscopic flaking or delamination of the SiC coating was observed, supporting the notion that SiC is thermal-mechanically robust and compatible with graphite substrates at elevated temperatures. Post-mortem profilometric analysis also indicates no pronounced change in surface roughness after plasma exposure. Finally, we investigate aspects of preferential sputtering and changes to surface composition exposure using scanning electron microscopy and Auger electron spectroscopy.

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