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Carbon Release Mechanisms in the DIIII-D Divertors * R. C. Isler, R. J. Colchin, J. Hogan *ORNL* N. H. Brooks, T. E. Evans, W. P. West *GA* D. G. Whyte *UCSD*

Carbon release mechanisms are examined through analysis of fluxes and spectral profiles of C I, CD and C_2 emissions. Physical and chemical sputtering are the major production processes. The C I influx, Γ_{CI}^{total}, reflects the total carbon fueling rate; contributions from chemical sputtering are estimated from the measured molecular fluxes using $\Gamma_{CI}^{mol} = 5.2 \times \Gamma_{C_2} + (\Gamma_{CD} - 8 \times \Gamma_{C_2})$. The first term accounts for dissociation of C_2D_y and C_3D_y and the second for dissociation of CD_4. When flux measurements indicate chemical sputtering dominates, the effective C I temperatures tend to lie in the range 1.0±0.2 eV, as expected from molecular breakup. When $P_{inj} \geq 9$ MW, molecular emissions are not usually evident, and effective C I temperatures reach values consistent with high-energy physical sputtering, 4–5 eV. These results suggest the fractions of C I generated by each mechanism may be evaluated from its effective temperature. The apparent suppression of chemical sputtering from the plasma-facing a-C:H / DLC layer has been studied with the BBQ and CASTEM codes.

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