**Quantification of chemical erosion in the DIII-D divertor and implications for ITER**

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## Abstract

The Porous Plug Injector (PPI) has proven to be an invaluable diagnostic for *in situ* characterization and quantification of erosion phenomena in DIII-D. Previous work has led to derivation of three primary figures of merit for chemical erosion (CE) in attached and cold divertor conditions: relative intensity of $C^+$ impurities from chemical and physical sources, the CE yield $\left(Y_{chem}\right)$, and effective photon efficiencies for chemically eroded products. Application of these figures of merit for accounting of observed absolutely calibrated CI and CII emission intensities is demonstrated to produce a self-consistent solution at the DIII-D targets. Reinterpretation of the CI $\left(C^0\right)$ spectral lineshape profile supports the relative roles of local chemical versus physical sputtering as previously determined for CII $\left(C^+\right)$. Finally, comparison of calculated *in situ* $Y_{chem}$ to that measured *ex situ* suggests a tokamak-specific lower energy threshold for CE, and presents potentially major implications for prediction of tritium co-deposition near the divertor targets in ITER.

PACS numbers*:* 28.52.Fa, 29.30.-h, 52.40.Hf, 52.70.-m