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In Situ Measurement of Electron Emission Yields from Plasma-Exposed Surfaces MARK SOBOLEWSKI, National Institute of Standards and Technology — Accurate plasma simulations require knowledge of the flux or yield of electrons emitted from plasma-exposed surfaces. Yields can be measured in beam studies, but it is usually impractical to produce a beam of each possible energetic particle that could be produced by the plasma. In contrast, in-situ measurements, performed during plasma exposure, may provide useful values or bounds for effective or total electron emission yields, summed over all or some subset of the energetic particles present in a given plasma. Here, measurements were performed in an inductively coupled plasma system equipped with variable-frequency rf bias. An insulating cap is placed on the rf-biased electrode to minimize edge effects. The rf voltage and current across the sheath adjacent to the rf-biased electrode are measured and analyzed by detailed, numerical sheath models, which allow the current of emitted electrons to be distinguished from other mechanisms of current flow. The observed dependence on voltage and rf phase allows some discrimination between emission induced by energetic positive ions and that induced by photons and metastables. The technique is validated by comparing results from argon discharges with beam studies and then is applied to plasma etching discharges in fluorocarbon gases.

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