Abstract Submitted
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Student Excellence Award Finalist: Surface recombination study in near real time in Cl_2 plasmas[1] JOYDEEP GUHA, VINCENT M. DONNELLY, University of Houston — We have started a new approach of studying surface reactions in near real time, in which a hollow section of the reactor wall is rotated at high frequencies between the plasma and differentially pumped diagnostic chambers, thereby periodically exposing the surface to the plasma and diagnostic probes. Surface recombination reactions of Cl atoms on anodized aluminum have been investigated by this technique in chlorine plasmas. Cl_2 desorption following surface recombination was monitored over a time scale of 0.8 to 38 ms after the surface was exposed to the plasma. Cl recombination probabilities were measured over a wide range of Cl atom flux by varying the plasma pressure and absorbed power. Langmuir-Hinshelwood Cl recombination coefficients (γ_{Cl}) were measured by extrapolating the desorption flux to t = 0. For 5mTorr 600W Cl_2 plasma, the desorption flux was 2.7 x 10^{15} $cm^{-2}s^{-1}$at t = 0. γ_{Cl} values ranged from 0.01 to 0.08 and were found to increase with increasing power and decrease with increasing total pressure. With plasma on, adsorption of undissociated Cl_2 competes with Cl adsorption particularly at high pressure and low power. Weakly bound Cl_2 appears to block adsorption sites on the surface, thereby reducing the recombination probability, as observed. Auger analysis of the surface at different plasma conditions suggests that less than 10% of adsorbed Cl atoms actually participates in surface recombination.

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