Study and optimization of boronization in Alcator C-Mod¹ ROMAN OCHOUKOV, DENNIS WHYTE, BRUCE LIPSCHULTZ, PSFC MIT — The new edge diagnostic, S³ (Surface Science Station) was used to study the effectiveness of boronization utilizing electron cyclotron (EC) discharge plasmas (90-80% He, 10-20% B₂D₆) in Alcator C-Mod. The boron (B) deposition was measured with a pair of quartz microbalances (QMBs) the faces of which were oriented parallel and perpendicular to the applied magnetic field. The plasma density profile was measured with a Langmuir probe. It was found that the B deposition rate peaks (at ~3.5 nm/min) away from the EC resonance near the upper hybrid (UH) resonance. The radial B deposition profile follows the ion saturation current profile, implying that the B deposition is primarily ionic. The application of the vertical magnetic field (B_{vert}) was found to narrow the plasma density and B deposition profiles near the UH resonance, thus localizing the deposition. A Monte Carlo simulation of B deposition on realistic surfaces requires a B ion temperature of ~1 eV, whose finite gyroradius explains the B deposition pattern on the QMB surfaces perpendicular and parallel to the magnetic field.

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