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Modeling of hot cathode DC magnetized plasma source ALEXANDRE LIKHANSKII, ALEXANDER PEREL, JOHN KOO, JAY SCHEUER, SHAHID RAUF, Applied Materials Inc — Hot cathode magnetized ion sources are widely used in ion implantation for the semiconductor industry. A typical ion source consists of a source chamber, biased hot cathode, biased electron repeller and extraction slit. A magnetic field confines the plasma**,** achieving plasma densities of 1e11 - 1e12 per cm3 at a few mTorr of gas pressure. By adjusting ion source parameters, one can obtain desired ion extraction current and ion spectrum. Despite such sources have been used for decades, their detailed understanding is still unclear. In the paper, we will present the results of numerical investigations of the ion source physics using two codes – AMAT's in-house hybrid plasma code CRTRS and commercial Particle-In-Cell (PIC) code Vorpal. CRTRS solves momentum equation for ions and splits electrons into two populations, bulk and beam electrons. Transport for bulk and beam electrons is solved using drift-diffusion approximation and Monte-Carlo collision formulation correspondingly. PIC code treats ions and electrons as particles and solves equation of motion and Monte-Carlo collisions with background gas. Specifically, we will analyze plasma diffusion across magnetic field in PIC simulations and discuss adjustments to the diffusion model in hybrid codes.

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