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A self-consistent modeling of an RF magnetron plasma with metallic and dielectric target for sputtering TAKASHI YAGISAWA, Keio University, SHUNJI KUROIWA, Shibaura Mechatronics Corp., TOSHIAKI MAKABE, Keio University — Radio frequency (RF) magnetron plasma has been developed as a promising candidate for various kinds of material processing. Magnetron-RIE is traditionally operated as an etching tool of dielectric (high-k) materials in industry. In addition, dielectric thin film prepared by RF magnetron plasma is widely used as a reflective layer for optical disks, such as CD DVD, Blue-ray disk and super-RENS disk. Deposition uniformity on a substrate is to a great extent influenced by the target erosion profile. There exist two major differences in erosion profile between a metallic target and a dielectric one. One is the presence of double minima in the erosion profile. The other is the discrepancy in the radial position between the maximum of the ion flux and the erosion depth. These are caused by a distinctive sheath profile in front of a dielectric target based on the surface charging. In this paper, we will focus on the 2D-t structure of an RF magnetron plasma with dielectric target at 5 mTorr in Ar. Emphasis will be given on the causation between the profile of the sheath potential and the ion velocity distribution incident on the target surface.

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