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A modeling of inductively coupled plasma in SF₆/O₂ for deep reactive ion etching of silicon TOSHIKAZU SATO, TOSHIAKI MAKABE, Keio University — There is still a strong requirement for a deep reactive ion etching (RIE) of silicon in micrometer scale for the fabrications of through wafer interconnects of LSI chips and micro electro mechanical systems (MEMS). Especially high etch rate more than 10 $\mu\text{m}/\text{min}$ is desirable for mass production of those devices. Here, attention should be given to the fact that the plasma is locally influenced by the wafer geometry comparable to the sheath thickness, causing distorted ion trajectories through the sheath. The design of fast silicon etching process can't be accomplished without understanding of the internal plasma properties and the plasma-surface interactions. In this work, we numerically investigate the 2D plasma structure in inductively coupled plasma in SF₆/O₂ and we also calculate the plasma structure near a sub-mm hole on a wafer. Calculation shows the thinner sheath as compared with that of electropositive gases. As a result, the sheath will be affected by smaller wafer geometry. The ion flux distributions at the position in a hole and the estimated etch rate will be discussed.

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