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FEM Simulation of Antenna Self-Inductance Effects in ICP MAKOTO MORIYAMA, KEIJI NAKAMURA, Chubu University, IVAN GANACHEV, Shibaura Mechatronics Corporation also with Chubu University — Inductively coupled plasma (ICP) has been widely used in the manufacturing of semiconductor devices. It is generated by inductive electric (E) field produced by the RF current of a coil antenna isolated from the plasma by a dielectric window. Large-amplitude RF voltage appears along the coil due to the coil's self-inductance resulting in strong electrostatic E-field near the antenna terminals. This amounts to capacitive coupling and increases the negative (with respect to the plasma bulk) self-bias potential on the window surface Acceleration in this sheath produces more energetic ions, and the ion bombardment often causes unwanted window sputtering. In this study we estimate sheath formation and self-bias voltage using commercially available FEM software. In one example ion bombarding energy of about 100 eV was observed in a 20 mTorr argon ICP driven by 13.56 MHz 40 App RF current in a one-turn coil antenna. The self-induced RF voltage at the antenna terminals was 1200 Vpp. The plasma was cylindrical with radius of 30 cm and height of 15 cm, which are typical conditions and size for plasma sources used in semiconductor device manufacturing. Next we will aim to evaluate antenna and electrostatic-shield designs for reducing the unwanted capacitive coupling

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