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2D Particle-In-Cell Simulation for the Effect of ION Enhanced Field Emission on Micro Gap Discharges CHANG HO KIM, HAE JUNE LEE, Department of Electrical Engineering, Pusan National University, South Korea — Due to the pioneering study for the analytical model of breakdown curve including field emission effect [1,2], we can approach the phenomena that were not explicitly described by classical Paschen's breakdown theory in a few micrometer regimes. During plasma processing, it is important to figure out if undesirable micro gap discharges occur and develop to a micro-arc, which leads to yield loss by wafer damage, wafer contamination, and tool downtime. A number of studies have been conducted to investigate micro gap discharges, but most of them have been performed experimentally or in a one-dimensional simulation [2]. In this study, we investigate the tendency of the primary parameters of plasma in a simulation domain with a gap size of a few micrometers using a two-dimensional particle-in-cell (PIC) simulation. The effect of ion-enhanced field emission is imposed in the simulation, and the breakdown voltage has been measured and compared with the theory [1] with the variance of the gap distance and the electrode structure. [1] D. B. Go and D. A. Pohlman, J. Appl. Phys. **107**, 103303 (2010). [2] D. B. Go and A Venkattraman, J. Phys. D: Appl. Phys. **47**, 503001 (2014).

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