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In-situ measurement of an accumulation and a reduction of bottom charging on a SiO₂ contact hole with a high aspect ratio in a pulsed 2f-CCP in Ar and in CF₄/Ar TAKESHI OHMORI, TAKESHI K. GOTO, Keio Univ., TAKESHI KITAJIMA, NDA, TOSHIAKI MAKABE, Keio Univ., SEIJI SAMUKAWA, Tohoku Univ., IKUO KURACHI, MIYAGI-OKI — It will be essential to develop in-situ diagnostics for charging damage of a surface exposed to plasma etching under close and complementary cooperation between optical and electric procedures in a top-down nanoscale plasma etching. The charging damage to the lower level elements in semiconductor devices is a latent issue during plasma etching of a topologically patterned wafer. In our previous paper, we have experimentally demonstrated a reduction of charging potential on a SiO₂ contact hole at the aspect ratio of 5, by utilizing the acceleration of negative charges to a wafer in a pulsed 2f-CCP with a SPC operation of the bias voltage in CF₄/Ar, and temporal change of the charging potential was observed corresponding to the flux velocity distribution of positive and negative charges incident on the contact hole under the conditions of a reduction on the charging potential [1]. In this work, we focus on the bottom charging potential at the high aspect ratio of 10 in a 2f-CCP in Ar and CF₄/Ar. The charging potential is increased above 55 V at a self-bias of -220 V in Ar. The potential in CF₄/Ar is decreased as compared with that of Ar.
[1] Appl. Phys. Lett. **83** (22), 4637-4639 (2003), Jpn. J. Appl. Phys. Express Lett. **44** (35), 1105-1108 (2005).

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