

Abstract Submitted
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Shading effect of electrons and positive ions in charging free plasma etching; In-situ measurement of temporal change of a contact hole charging in a pulsed two frequency CCP. TAKESHI OHMORI, TAKUMI AKAIKE, TAKESHI K. GOTO, Keio University, TAKESHI KITAJIMA, NDA, Keio University, TOSHIAKI MAKABE, Keio University — Miniaturization in ULSI progresses toward device elements of nanometer size, and charging damages during plasma etching will be actualized. All kinds of particle injected into a trench or SiO₂ contact hole with a miniaturized structure on a wafer is shaded base on the topographical and electrical profile. While it is common that the electron shading causes a bottom charging, we will exhibit an ion shading effect by using a measurement of the temporal change of the charging potential on the bottom surface in the pulsed 2f-CCP. In our previous work using an optical emission CT and contact hole potential[1], we showed a qualitative behavior of the charge reduction on the bottom during a short time by applying a single positive component (SPC) of the bias pulse in a pulsed 2f-CCP in CF₄/Ar. In the present work, we analyze and discuss the details of a temporal change of a SiO₂ hole charging during one on/off period of the VHF. The charging potential on the bottom increases and decreases by the injection of low energy negative charges and high energy positive ions during the period of the VHF, respectively. In addition, negative charges accelerated by a double layer structure decrease the charging potential in a phase of SPC. [1] T. Ohmori, T. Akaike. T. K Goto and T. Makabe, 2004 57th GEC (2004).

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