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Time-resolved probe measurement in pulsed plasma using advanced boxcar technique DONG-HWAN KIM, Department of Nanoscale Semiconductor Engineering, Hanyang University, HYUN-JU KANG, JUN-HYEON MOON, Department of Electrical Engineering, Hanyang University, MOO-YOUNG LEE, Department of Nanoscale Semiconductor Engineering, Hanyang University, SEYEOL PAEK, CHIN-WOOK CHUNG, Department of Electrical Engineering, Hanyang University, JINYOUNG BANG, Memory E Technology Team, Samsung Electronics — A novel plasma diagnostic method based on boxcar technique is developed for time-resolved measurement of electron energy distribution function (EEDF) in pulsed plasma. Pulsed plasma have been used for many applications including etching and deposition in semiconductor manufacturing because the pulsed plasma reduces the plasma induced damage (PID). In order to understand underlying physics of the pulsed plasma, probe measurement based on boxcar theory have been performed. However, in conventional method, measurement time is very long (over an hour for measurement of 1 kHz pulsed plasma), and displacement current, generated due to use of impulse voltage, can result in significant inaccuracy of EEDF especially in low density plasma. In this work, a novel method using sequential switching of dc voltage and reconstruction of measured current is proposed; the detail procedures were mentioned by Godyak and Alexandrovich (Proceeding of XXVIIth ICPIG, 2005). This method reduces the time required for the measurement to a few minutes, and there is not influence of the displacement current, resulting in reliable measurement of EEDF. Using this method, well-known characteristics in active and after-glow of the pulsed plasma are well observed.

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