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Measurement of the total energy lost per electron-ion lost in argon, helium and oxygen inductively coupled plasmas JU-HWAN KU, YOUNG-KWANG LEE, SEUNG-JU OH, CHIN-WOOK CHUNG, Hanyang University — The total energy lost per electron-ion pair lost was measured at various gases (Ar, O_2, He, Ar/O_2,Ar/He) and in the pressure range of 5–50 mTorr in an inductively coupled plasma. A floating harmonics method [1] was used to measure the electron temperatures and ion fluxes at the chamber wall. The absorbed power was determined by measuring the antenna resistance and current. The total energy lost were determined from a power balance equation of a global model. The measured of the total energy lost per electron-ion pair ranged from 80 V to 250 V for Ar and from 70 V to 90 V for He, respectively. In molecular gas, it ranged from 250 V to 2300 V for O_2plasma due to additional collisional energy losses. The measured total energy lost decrease with absorbed power and increase with pressure. In mixture discharges, the total energy lost rapidly increase with mixing ratio of oxygen in Ar/O_2 plasma while the total energy lost slightly decrease with mixing ratio of helium in Ar/He plasma. These experimental results were consistent with theoretical ones.

[1] M. H. Lee, S. H. Jang, C. W. Chung, J. Appl. Phys. 101, 033305 (2007).

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