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The behavior of floating potential and electronegativity during the E-H transition in an electronegative inductively coupled plasma AIXIAN ZHANG, MOO-YOUNG LEE, CHIN-WOOK CHUNG, Hanyang Univ — This study experimentally investigates the evolutions of floating potential and electronegativity during the E-H transition of an inductively coupled oxygen plasma. The electronegativity, plasma potential, floating potential, electron temperature and electron energy probability function (EEPF) are measured by means of a small cylindrical Langmuir probe. The electronegativity can be deduced by applying the orbital-motion-limited (OML) theory to the positive ion current portion of the I-V characteristic curve, and assuming that the electron current is balanced with the positive ion current at the floating potential. When the plasma absorption power increases in the range of 8.2 W to 185 W, the EEPFs do not escape from the Maxwellian distribution, and the electron temperature remains constant around 3.5 eV. Moreover, the floating potential tends to decrease in the E mode, be minimized in the EH transition region, and rise in the H mode. Contrariwise, the electronegativity peaks in the transition region and decreases towards E and H modes. This behavior has never been observed theoretically or experimentally in electronegative plasma.

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