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Experimental study of a very high frequency, 162 MHz, segmented electrode, capacitively coupled plasma discharge NISHANT SIRSE, CLEO HARVEY, CEZAR GAMAN, BERT ELLINGBOE, Dublin City University — Radio-frequency capacitively coupled plasma (CCP) discharge operating at a very high frequency, 30-300 MHz, offers many advantages over standard 13.56 MHz CCP. However, there is a limited flexibility on the choice of driving frequency and substrate size due to plasma non-uniformity caused by the standing wave effect and edge effect. To overcome this issue segmented electrode CCP's are proposed and researched. Despite its numerous advantages the power coupling mechanism and plasma chemistry in this type of discharge are not fully understood due to lack of experimental data. In this paper, we present the experimental study of a segmented electrode, 3x4 tile array (10x10 cm square tile with 1 cm tile-to-tile separation), CCP discharge driven at 162 MHz. We measured plasma uniformity and gas temperature using hairpin probe and optical emission spectroscopy respectively. A homemade RF compensated Langmuir probe is employed to measure the Electron Energy Distribution Function (EEDF) by second harmonic technique. Energy resolved quadrupole mass spectrometer is utilized to measure the ion energy distribution. Discharge/plasma properties are investigated for several operating conditions and for power coupling mode in both washer board and checker board configuration. The experimental results show that the uniform plasma density can be maintained over a large area along with highly non-equilibrium condition to produce unique gas phase plasma chemistry.

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