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Reactive Microplasma Discharge for In-Situ Study of Surface Modification[1] SOPHIA GERSHMAN, YEVGENY RAITSES, Princeton Plasma Physics Laboratory — In-situ evaluation of surface modifications induced by reactive plasma-surface interactions is an important part of the fundamental studies of the processes at plasma-surface interfaces. We have developed a microdischarge cell for use inside an Environmental Scanning Electron Microscope (ESEM). Plasma is ignited inside hollow cylindrical electrode and interacts with ta grounded substrate. The substrate is interchangeable and the plasma gasses CO_2, N_2, water vapor, are consistent with the requirements of the ESEM. The microdischarge cell has been characterized at 2-8 torr and tested in an ESEM in a hollow cathode (MHC) or a hollow anode (MHA) configuration. The electrical measurements show that the MHC configuration has lower reduced field and higher plasma density than MHA. The optical emission spectra of the CO and N_2 bands and H lines were used to find the rotational temperature of 450 K in both configurations, and the vibrational temperature of 3700 K for the MHC and 4500 K for the MHA. The electron excitation temperature is higher in the MHA configuration. MHA can potentially offer a better controllability of the electron energy distribution function, which is useful for micro plasma applications.

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