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Neutral gas collisional heating and the 0D/1D modeling in a semiconductor plasma reactor MASASHI SHIMADA, GEORGE R. TYNAN, Department of Mechanical and Aerospace Engineering, University of California, San Diego — The significant neutral gas temperature increase has been observed in various noble gases in the center of an inductively coupled plasma (ICP) chamber and the actual neutral gas pressure has been obtained by considering the thermal transpiration effects with this neutral gas increase. A plate which consists of 8 vertical optical ports with collimating lens and a movable optical fiber probe have been developed and used to measure axial and radial profile of gas temperature in an inductively coupled plasma reactor respectively. The rotational temperature obtained from the second positive band of Nitrogen molecule has been compared with the Doppler broadening translational temperature of the noble gas (Ar/He) emission line in a various partial pressure of N_2 in Ar/ N_2 and He/ N_2 mixture, and both temperature have been observed to be in equilibrium in the conditions of our plasma experiment. 0D/1D neutral gas heating model have been developed and compared with experimental results. Monte Carlo simulation have been carried out to model the ion acceleration by pre-sheath electric field.

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