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**Modeling and experimental study of molecular nitrogen dissociation in Ar – $N_2$ ICP discharge** NAMJUN KANG, FREDDY GABORIAU, ANDRE RICARD, Université de Toulouse; UPS, INPT; LAPLACE (Laboratoire Plasma et Conversion d'Energie); 118 route de Narbonne, F-31062 Toulouse cedex 9, France, SOO-GHEE OH, Division of Energy System Research, Ajou University, Suwon 443-749 Korea — The dissociation of the nitrogen molecule in Ar-$N_2$ ICP discharge was studied both experimentally and theoretically. In experiments the total gas pressure is varied from 20 mTorr to 500 mTorr, and the fraction of $N_2$ gas is varied from 1 % to 100 %. To measure the absolute atomic nitrogen density the two-photon absorption laser-induced fluorescence (TALIF) spectroscopy was used. It is observed that the absolute N density increases with increasing pressure whereas the absolute N density decreases for pressure higher than 100 mTorr. The dissociation rate reaches about 0.8 % at low pressure and strongly decreases with increasing pressure. With adding argon to the mixture, we observe that the dissociation rate is enhanced when going from a pure nitrogen discharge to an argon mixed discharge. To calculate the plasma parameters, a global (volume averaged) model was developed. The variation of the electron temperature and the particle densities were calculated by solving the particle and energy balance equations. The model calculations are compared with measurement results and the population and loss rates of each species are described in each discharge condition.

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