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Simulation of atmospheric pressure microplasma in Ar on the basis of heat transfer MASANORI YAMASAKI, Keio University, TAKASHI YAGISAWA, TETSUYA TATSUMI, TOSHIAKI MAKABE — In a decade, atmospheric pressure microplasmas have been applied to wide range of fields based on the characteristics of high plasma density. The underlying mechanism for sustaining a stable glow discharge, however, is not well understood. In this study, the microplasma characteristics at atmospheric pressure are numerically investigated, particularly focusing on a heat transfer in the whole system. We consider a capacitively coupled plasma with the characteristic size of several hundred micrometers, driven by radio frequency (13.56 MHz) in a cylindrical reactor under atmospheric pressure of pure Ar. A plasma fluid model is coupled with a neutral gas dynamics model including the temperature and flow in gas phase. A wall heating caused by energetic ions and metastables coming from the plasma is also incorporated in the model. Under a constant gas pressure, the local depletion of a neutral gas density occurs due to a gas heating, simply shown by ideal gas law. The influence of the local gas density on the structure of the microplasma will be mainly discussed in a periodic steady state.

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