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Experimental and theoretical results on effect of multi-step ionization on total energy loss in an argon inductive discharge YOUNG-HUN HONG, CHIN-WOOK CHUNG, Hanyang University — The change of total energy loss (ε_{T}) with electron temperature was analyzed by a global model considering multi-step ionization in the argon inductive discharge. As pressure increases, collisional energy loss (ε_{C}) increases but mean kinetic energy lost per ion lost (ε_{i}) and mean kinetic energy lost per electron lost (ε_{e}) decrease. Therefore, there is a pressure that ε_{T} becomes minimum and its corresponding electron temperature is present. When ε_{T} is minimized at certain pressure and electron temperature, the plasma is more efficiently generated and the density is maximized. The ε_{C} considered the multi-step ionization is lower than the unconsidered case. It can be predicted that there will be a minimum value of ε_{T} at lower electron temperature. In this work, we studied the effect of multi-step ionization on the electron temperature where ε_{T} is the minimum. For each condition, the electron temperature and the plasma density were measured and the total energy loss ε_{T} was obtained through these measured values.

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