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 ($\varepsilon_T$) with electron temperature was analyzed by a global model considering multi-step ionization in the argon inductive discharge. As pressure increases, collisional energy loss ($\varepsilon_c$) increases but mean kinetic energy lost per ion lost ($\varepsilon_i$) and mean kinetic energy lost per electron lost ($\varepsilon_e$) decrease. Therefore, there is a pressure that $\varepsilon_T$ becomes minimum and its corresponding electron temperature is present. When $\varepsilon_T$ is minimized at certain pressure and electron temperature, the plasma is more efficiently generated and the density is maximized. The $\varepsilon_c$ considered the multi-step ionization is lower than the unconsidered case. It can be predicted that there will be a minimum value of $\varepsilon_T$ at lower electron temperature. In this work, we studied the effect of multi-step ionization on the electron temperature where $\varepsilon_T$ is the minimum. For each condition, the electron temperature and the plasma density were measured and the total energy loss $\varepsilon_T$ was obtained through these measured values.