

Diagnostics of Helium plasma by using optical line intensity ratio method

Wonwook Lee and Duck-Hee Kwon

Nuclear Data Center, Korea Atomic Energy Research Institute, Daejeon, 305-353, Korea

Electron temperature (T_e) and electron density (n_e) of He plasma with $T_e < 10\text{eV}$ and $n_e < 10^{14}\text{cm}^{-3}$ which was generated in our own small scale plasma discharge chamber, were diagnosed by optical line intensity ratio method. Emission spectrum of neutral He was observed by Czerny-Tuner monochromator which was calibrated with the tungsten halogen lamp. The transition lines of $3^1\text{D}-2^1\text{P}$ (667.8nm), $3^3\text{S}-2^3\text{P}$ (706.5nm), and $3^1\text{S}-2^1\text{P}$ (728.1nm) of He I were selected to diagnose the T_e and n_e of He plasma. The excited states populations for the emission line intensity ratio were calculated by a collisional radiative model [1] for given T_e and n_e . The diagnosed plasma parameters (T_e and n_e) were compared with those measured by using single electric probe.

References

[1] M. Goto, "Collisional-radiative model for neutral helium in plasma revisited", *Journal of Quantitative Spectroscopy & Radiative Transfer* 76, 331 (2003).