

# Progress of Z-dependence analysis of soft X-ray spectra from highly charged heavy ions using high-temperature plasmas

Soft X-ray emission spectra from highly charged heavy ions are of particular interest in nuclear fusion research, industrial light source applications as well as basic atomic physics. Though a number of experimental spectra have been recorded so far in tokamaks and electron beam ion traps (EBITs), the available data are still insufficient to complete the atomic number ( $Z$ ) dependencies for the elements in the 5th and higher periods. In the last decade, therefore, we have systematically recorded soft X-ray spectra from highly charged ions of various heavy elements using high-temperature plasmas produced in the Large Helical Device (LHD) at the National Institute for Fusion Science.

In this paper we present recent progress of Z-dependence analysis for the soft X-ray spectra from highly charged ions of the elements with  $Z$  from 57 to 74, based on the experimental data taken in the LHD. In particular, we focus on the isolated lines of Cu-, Zn-, Ga-like ions which have relatively simple spectral features. The measured wavelengths are compared with the other data taken in tokamaks and EBITs, as well as theoretical values calculated with a multi-configuration Dirac-Fock code. In addition, the  $Z$  dependencies are interpolated or extrapolated to assign unidentified lines. As a result, a number of lines have been experimentally identified for the first time. Some of the results clearly manifest large effects of configuration interaction and spin-orbit interaction, which are peculiar to highly charged heavy ions.

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