

Studies of tungsten spectroscopy and resonant electron ion recombination at Shanghai-EBIT

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Tungsten will be used as the divertor material of the future TOKAMAKS, for the reason of its high melting point, low sputtering, corrosion resistance, and low hydrogen retention characteristics. As a heavy impurity element, it is ionized but not fully stripped in the fusion plasma. Its radiation will lead to a huge amount of energy lose, while its spectra is a useful diagnostic tool for key plasma parameters.

In the past few years, Shanghai-EBIT [1] dedicated to study the atomic process for application of fusion research. In our EBIT, tungsten spectroscopies from visible to EUV region were observed for the charge states of W^{7+} - W^{28+} [2-6]. Many of these lines were identified for the first time.

Dielectronic recombination (DR) plays an important role in the high temperature plasma. It significantly affects the plasma temperature, the charge state distribution, and the ion level population. The *K*-shell excitation DR of He-like to O-like tungsten [7-9] was carefully studied at the EBIT. The cross sections were measured at an accuracy level of about 10%. In *L*-shell excitation DR process, metastable states were observed [10]. The processes were also studied for a few other elements, e.g., argon, xenon [11, 12]

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