

§20. Study of Neutral Hydrogen Atom and Impurity Behaviors in Heliotron J III-2

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The main object is to make clear the magnetic configuration dependence of heating efficiency by ICRF and NBI for Heliotron J plasmas. In order to obtain high heating efficiency the reduction of impurities is necessary. The impurity behavior is investigated with a vacuum ultraviolet spectrometer in the wavelength region from 5 to 40 nm in ICRF and NBI heated plasmas.

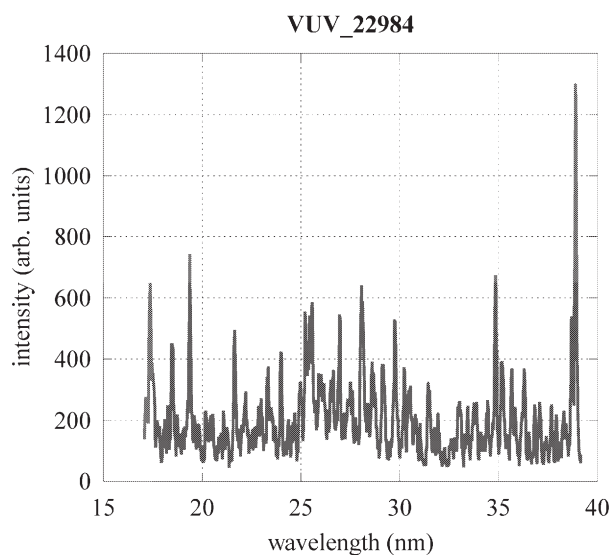


Fig. 1

Figure 1 shows a typical VUV spectrum observed in ICRF heated plasma. The most prominent spectra are Fe, Ti, Cr, C and O ions. In particular, titanium is dropped into plasmas accidentally and many spectral lines are identified. They are Ti XI(38.61), Ti X(36.01, 28.96), Ti IX(29.63, 27.87, 26.79), Ti VIII(26.36, 25.86), Ti VII(26.48, 25.47) and Ti VI(25.53, 25.11).

Figure 2 show the dependence of Ti XI line intensity on the ICRF power. The magnetic configuration is the standard one in Heliotron J confining magnetic field. The distinguished character of the magnetic configuration in Heliotron J is controllability of the bumpiness.

The dependence of the impurity behavior on the bumpiness is investigated.

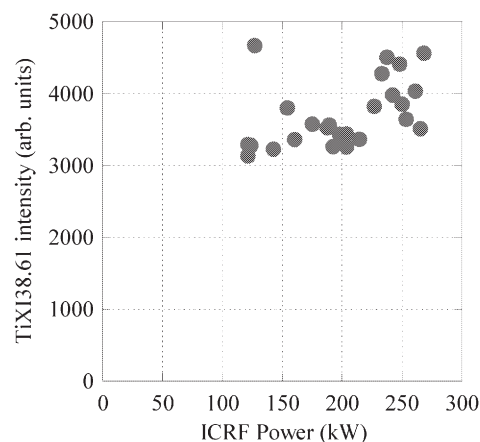


Fig. 2

As for neutral hydrogen atoms, the Doppler-shifted H α spectral intensity is measured in order to estimate beam energy fraction and beam decay. Figure 3 shows an example of the Doppler-shifted H α spectral profiles of E, E/2 and E/3. The injection energy E is 25 keV.

The sightlines are provided for three toroidal and ten for poloidal directions. The decay length of the injected beam is estimated from the intensities with three toroidal positions.

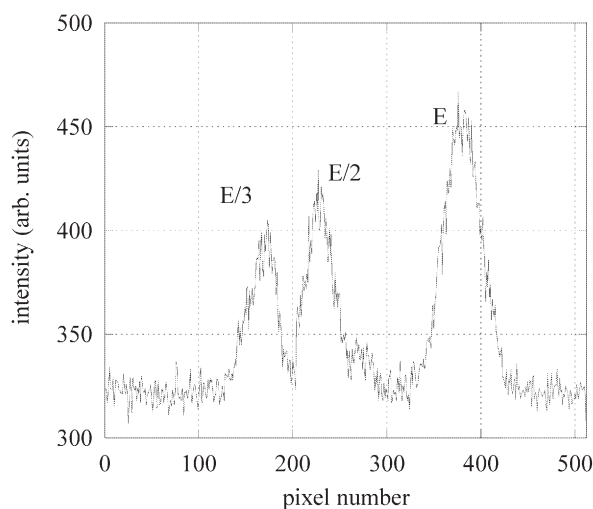


Fig.3

The capability for estimating the density ratio of C $^{6+}$ ion to the electron is also investigated.