Graphite as LID Material

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In order to suppress the oxygen impurity in the LHD plasma, the use of boron material such as B_4C is suitable. However, there is a question on the hydrogen recycling caused by such the boron material. Since the hydrogen recycling strongly depends on the retained hydrogens, the hydrogen retention of the B_4C was examined by using the ECR ion source and a technique of thermal desorption spectroscopy.

It was found that the hydrogens trapped in the boron and the carbon were desorbed at the temperatures of 300 °C and 700 °C, respectively (Fig.1). Thus, the hydrogens retained in the boron can be removed by the baking with the temperature of 300 °C. After the hydrogen ion irradiation, the helium ion irradiation was carried out to decrease the amount of the hydrogen retention. The hydrogens retained in the boron was largely desorbed by the helium ion impact (Fig.2). By changing the fluence of the helium ion, we observed the reduction of the hydrogen retention to the fluence (Fig.3). Although the hydrogen amount of the carbon was not sufficiently reduced, that of the boron was largely reduced.

In this study, it was found that the uses of the boron material was suitable for LHD, because of relatively easy conditionings, in addition to the oxygen gettering action.

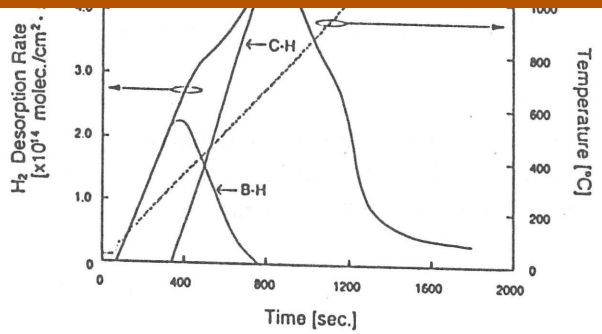

Fig.1 Thermal desorption spectra for H_2 of B_4C.

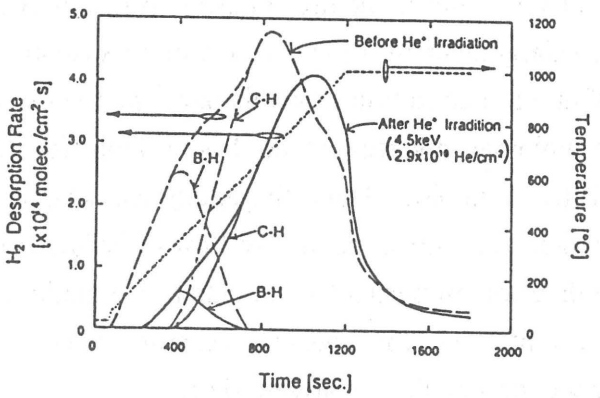

Fig.2 Thermal desorption spectra before and after helium ion irradiation.

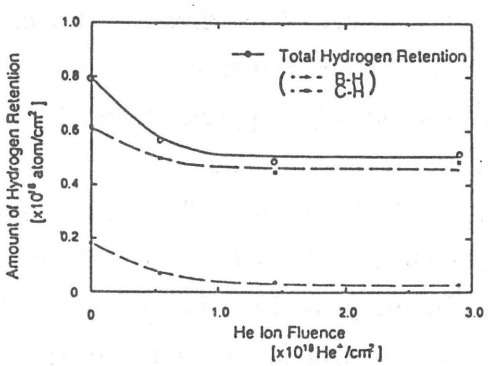

Fig.3 Reduction of hydrogens retained in the carbon and the boron due to helium ion irradiation.

References

1)Yamauchi, Y., Hirohata, Y., Hino, T. and Yamashina, T., J. Vac.Soc.Jpn., 37 (1994) 359.
2)Hino, T., Yamauchi, Y. and Yamashina, T., J. Nucl.Mater., 210 (1994) 226.