§16. Wall Conditioning of JIPP T-IIU by Lithium Deposition

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Recently, *in situ* coating of thin lithium layers with evaporation [1] and pellet injection [2] has been developed. Here, the lithium evaporation experiment was performed on JIPP T-IIU. 100-250 mg of lithium in an oven was evaporated at 500 °C in vacuum and deposited onto a limited area of ~ 1 m^2.

Figure 1 illustrates the shot to shot behavior of the emission intensities of OII and CII lines and the radiation power normalized by the line average electron density $\bar{n}_e$. The lithium layers were deposited at the time indicated by the dashed line. After the Li deposition, the oxygen concentration in ohmic discharges was lowered by a factor of two while the reduction of carbon impurities was 40 %. The radiated power was lowered by a factor of two.

Figure 2 shows the time variation of various line emissions and the radiation loss power, before and after the lithium deposition when a 0.3 MW neutral beam was injected, 130° toroidally apart from the lithium source. The target plasma parameters were $\bar{n}_e$= 3-5 x 10^{19} m^{-3}, I_p= 220 kA and B_t= 2.6 T. After the NBI phase, the oxygen and carbon impurities were clearly suppressed, with a reduction in the radiation loss. From the early ohmic phase (t ~ 80 ms), the emission intensity of the Dα line was lower than the intensity without lithium, which implies that lithium coating suppresses hydrogen recycling.

However, a dramatic improvement in tokamak plasma confinement by the use of lithium was not observed in the present experiment. Higher power and higher density are required to see more clearly the effects of wall conditioning with lithium evaporation.

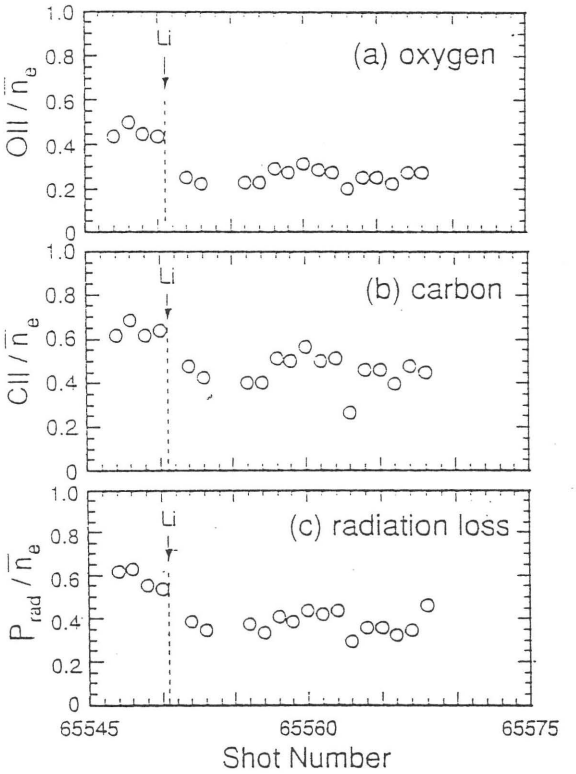


Fig.1. Shot-to-shot evolutions.

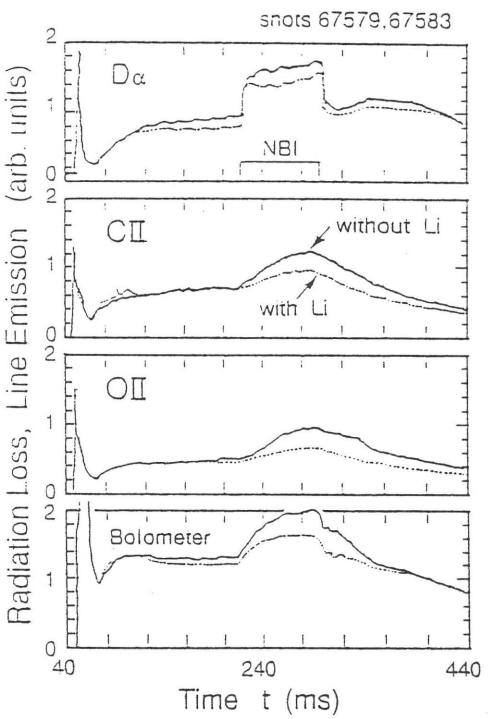


Fig. 2. Time evolution of line emissions.

References

1) Isozumi, T., Yoshida, S. and Sugar, H., Kaku-Yugo Kenkyu 60 (1988) 304.
2) Snipes, J. A., et al., J. Nucl. Mater. 196-198 (1992) 686.