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EX/P5-36: Studies of Plasma-Lithium Interactions in TJ-II

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In the present work, three different experiments concerning the specific features of plasma –lithium interactions will be addressed.

First, a solid bar of lithium with biasing and displacement capabilities has been exposed to the plasma edge in TJ-II under lithiated wall conditions. Heating powers up to 0.8 MW (ECRH and NBI) were injected into the plasma, leading to unmitigated power densities at the bar tip up to 30 MW/m². Edge parameters were characterized by a supersonic He beam diagnostic and Li I, LiII and H α emissions at the bar and its proximity were recorded.

Secondly, we have performed a search for other characteristic effects of lithium surfaces, other than the well-known low recycling. We recorded the I–V characteristics and Li emission signal of lithium covered metallic electrodes in H and He Glow Discharge plasmas. The plasma parameters and electron energy distribution were obtained from the analysis of a Langmuir probe signal and from the measurement of the 728/706 (singlet to triplet) emission lines of He in the corresponding discharges. At small negative potentials of the electrode, an apparent excess of ion current is driven, which is well correlated with the presence of secondary electron emission from the surface upon suprathreshold electron bombardment, but with enhanced yields over the bibliographic values.

Finally, a liquid lithium limiter (LLL) based on the Capillary Porous System (CPS) has been installed and tested in TJ-II [4]. The movable limiter has Langmuir Probes and thermocouples for diagnostic as well as biasing capabilities. Upon exposure to the plasma, the limiter can be fully outgassed under vacuum in order to assess the hydrogen retention characteristics and its dependence on operation temperature.

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