

PROBE MEASUREMENTS DURING EXPERIMENTS WITH LIQUID METAL DIVERTOR TARGETS IN COMPASS

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The paper presents results from swept divertor Langmuir probe measurements of the plasma parameters during the first experiments with liquid Li and LiSn alloy on the COMPASS tokamak [1]. A small sample was placed in the divertor high-field side (HFS) based on a capillary porous system (CPS) technology, whereby the liquid metal is impregnated in a metallic mesh and confined against MHD effects by capillary forces [2].

The radial distribution of the ion saturation current, the plasma potential, and the electron temperature were studied in D-shaped, low- (L-mode) and high-confinement modes (H-mode) deuterium discharges for different exposure of the samples. During the Li experiment, the three ionized states of Li (Li0, Li1+, Li2+) were observed by fast visible color cameras showing that neutral lithium was very well spatially localized in the vicinity of the CPS module. Unfortunately, some droplets were seen to move crosswise on the CPS mesh by $J \times B$ forces towards the edge of the module.

Although the divertor probes were not located at the samples position, some changes in the plasma parameters were observed in the Li experiment when the sample was at more than 5 mm above the divertor surface. Using the vertical probe in the SOL plasma, a slight cooling (around 5 – 10 eV) was found resulting in a decrease in the heat flux.

During the experiment with the LiSn alloy, the plasma parameters measured by the divertor probes did not change even at the maximal insertion of the sample at 2.5 mm; also, no damage to the CPS mesh and no contamination of the main and SOL plasma were observed.

Acknowledgments: This research has been partially supported by the Joint Research project between the Bulgarian and Czech Academies of Sciences, BAS – 20-13, by the European Union project WP DTT1-LMD.P1-T001-D001.

References:

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