Impact of liquid metal surface on plasma-surface interaction in experiments with lithium and tin capillary porous systems

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The lithium and tin capillary-porous systems (CPSs) were tested with steady state plasma in the PLM plasma device [1] which is the divertor simulator with plasma parameters relevant to divertor and SOL plasma of tokamaks. The lithium and tin CPSs were manufactured using developed technology and experience of experiments of such CPSs on tokamaks T-10, T-11M, FTU. The CPS consists of tin/lithium tile of 10x10x1 mm in size fixed between two molybdenum nets (mesh). Such CPS construction is proposed (see [2]) to protect plasma-facing components and to provide improved characteristics of the plasma-surface interaction. The module of the CPS is constructed in the bath and faced to plasma column in the PLM device. Steady state plasma load of 0.1 — 1 MW/m\textsuperscript{2} on the CPS during more than 200 minutes was achieved in experiments which is a modeling condition proposed for a fusion reactor. The heating of the CPS was controlled remotely including biasing technique which allows to regulate evaporated metal influx to plasma. After exposure, the materials of the tin and lithium CPSs were inspected and analyzed with scanning electron microscopy. Experiments have demonstrated sustainability of the tin and lithium CPSs to the high heat steady state plasma load expected in a large scale tokamak. The effect of evaporated lithium and tin on the plasma transport/radiation and plasma turbulence was studied with Langmuir probe and spectroscopy to evaluate changes of plasma properties and plasma-surface interaction.