

## Visible spectroscopy with liquid tin limiter on FTU plasma

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In the Frascati Tokamak Upgrade (FTU), two different liquid metals, as plasma facing materials, have been studied, lithium and tin. The successful experiments with liquid lithium limiter, started since 2006, have pointed out the importance to explore other liquid metal materials such as tin whose operating window is much larger than that of lithium. The liquid tin limiter, TLL, has been tested on FTU in the experimental campaign, started at the end of 2016 [1]. The preliminary analysis of the experimental data has been focused in detecting the presence of tin in the discharge: suitable monitors are the spectroscopic diagnostics in the visible, VUV and XUV ranges [2]. The experimental observation of the tin spectral lines represents a new goal for extending the database of atomic nuclear data in the plasma tokamak research. The observed spectra are compared with the NIST database. In particular, the strong spectral lines of SnII, 607.8 nm and 645.3 nm, have been identified together with other weaker ones in the visible and VUV range, while the XUV spectra have been analysed and discussed in [3]. Moreover the quantity of the impurity in the plasma, in the presence of tin limiter, has been analysed. Since the presence of the tin in the discharge is strongly dependent on the heat load on the TLL, the correlation among the observed spectra and the heat load on the TLL has been explored. Particular attention has been placed for experiments with high heat load on TLL, performed operating with high electron density and with additional heating power. For FTU standard discharges with  $I_p = 0.5\text{MA}$  and  $B_T = 5.4\text{T}$ , the tin limiter has been exposed to the plasma with a heat loads up to  $18\text{ MW/m}^2$ , reaching the maximum temperature value of  $1700\text{ }^\circ\text{C}$ . The paper reports on the spectroscopic measurements obtained during experiments with the tin limiter in FTU tokamak.

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1. G.Mazzitelli et al., *IAEA 2016, 'Liquid metal experiments on FTU'*, Ex/P8-21
2. G.M.Apruzzese et al., ISLA-V 2017, '*First spectroscopic results with tin limiter on FTU plasma*', paper submitted to Plasma Physics Reports
3. F.Bombarda et al. '*High Resolution EUV Spectroscopy on FTU with Tin Liquid Limiter*', submitted to this conference