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Measurement of Hydrogen Molecular Rotational Temperatures in LTX-β for the Thermometry of Plasma-Facing Lithium Surfaces[1] NAO YONEDA, Kyoto Univ., FILIPPO SCOTTI, LLNL, RONALD BELL, PPPL, TAI-ICHI SHIKAMA, Kyoto Univ., PAUL HUGHES, ANURAG MAAN, PPPL, VLAD SOUKHANOVSKII, LLNL, DENNIS BOYLE, RICHARD MAJESKI, PPPL, KAZUAKI HANADA, RIAM, MASAYUKI ONO, PPPL, MASAHIRO HASUO, Kyoto Univ. — LTX-β is a spherical tokamak device operated with plasma-facing surfaces coated with solid and liquid lithium. We measured the variation of the H_2 d-state rotational temperature ($T_{\rm rot}$) in LTX-β to deduce the surface temperature because phase change or passivation of lithium may reduce the accuracy of conventional surface thermometry using an infrared camera. H_2 emission line spectra (Q1-Q5(0-0) of Fulcher-α band) were observed under three surface conditions: fresh solid lithium, passivated solid lithium, and liquid lithium. We used two radial viewing chords directed to the inboard limiter and a spectrometer (F/1.8, and 70 pm wavelength resolution) for the measurement. $T_{\rm rot}$ was estimated from the relative intensities of the emission lines assuming a Boltzmann distribution. The estimated $T_{\rm rot}$ was higher for the liquid surface than for the fresh solid surface. No obvious dependence of $T_{\rm rot}$ on the electron density near the limiter was observed for densities in the range of 0.2–1.2$\times 10^{18}$ m^{-3}.

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