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Surface structure of (La,Sr)CoO3 film under electrochemical conditions

Perovskite oxides exhibit various functionarities. In the current social circumstances, their catalytic functionality is one of the most significant characteristics. Some of Co oxides are known as high performance water splitting catalysts. Here, we report in-situ surface x-ray diffraction measurement of (La,Sr)CoO3 films grown on Nb doped SrTiO3 (001) substrates.

Experiments were done at BL-3A and 4C of the Photon Factory, KEK, Japan. The (La,Sr)CoO3 films were grown on atomically flat SrTiO3 substrate by pulsed laser deposition. Measurements were done in vacuum and under electrochemical conditions (0,1M KOH aq., electric potential in the range of $\pm$0.7V vs Ag/AgCl).

In-vacuum structure was analyzed with our Bayesian inference software CTR-structure[1]. In the vacuum condition, the surface/interface structure has 3.84\AA of the out-of-plane lattice parameter, and Sr condensation at the surface was also observed. In the electrochemical conditions, we obtained clear voltage dependence of the CTR intensity at several Q positions. Detailed analysis is now under way.

[1] M. Anada et al., J.Appl.Cryst. 50, 1611 (2017).; K. Nagai et al., J. Appl. Cryst. 53, 387 (2020).

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Interfaces during chemical reactions and catalysis

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