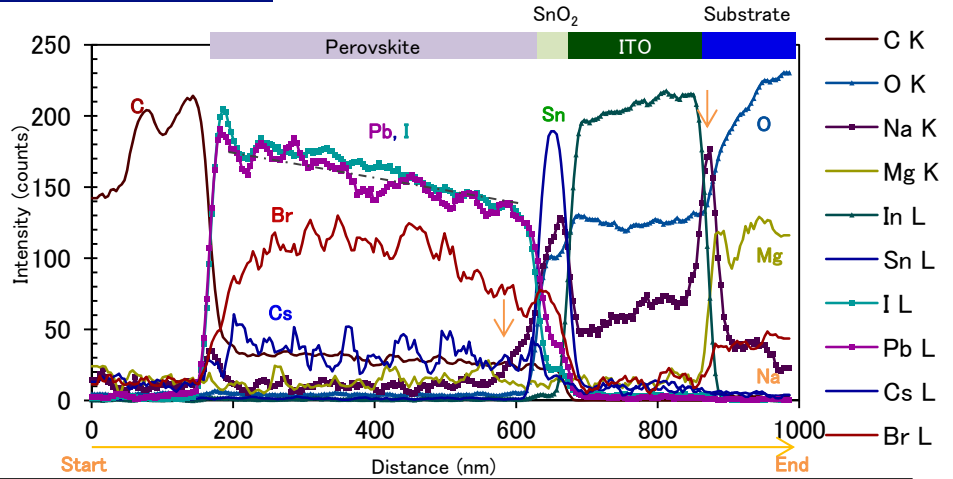
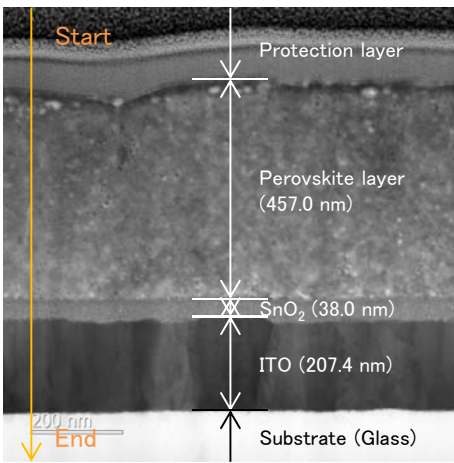


# Depth profile analysis to element and organic matter of Perovskite Solar Cell

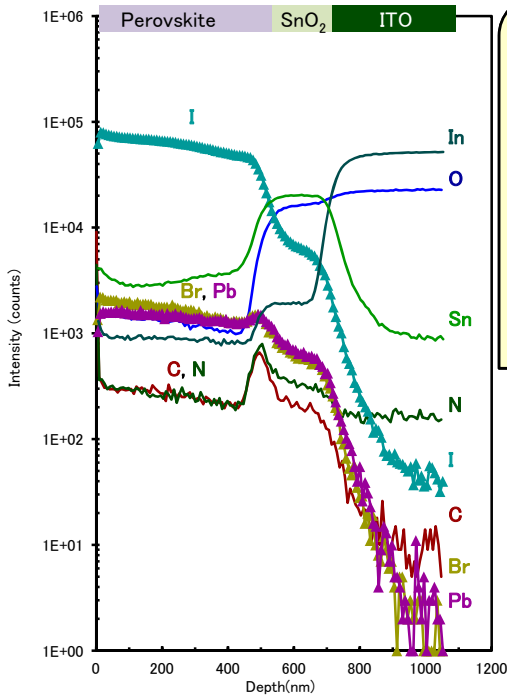
Since the Perovskite Solar Cell (PSC) has high efficiency and simple manufacturing process, it is expected as the next generation solar cell. Cross-sectional TEM, Dynamic-SIMS(D-SIMS) and GCIB-TOF-SIMS can be performed the distribution of element and organic matter with high spatial resolution and high sensitivity under non-exposed atmospheres.

## Cross-sectional STEM image and EDX line profile



It was detected that the intensity of Pb and I elements on the surface-side of the perovskite layer was higher than that of the inside, and the intensity of Na element was high at ITO/ substrate interface. Heating behavior of materials can be observed from room temperature to 1300°C by in-situ TEM observation.

## D-SIMS depth profile

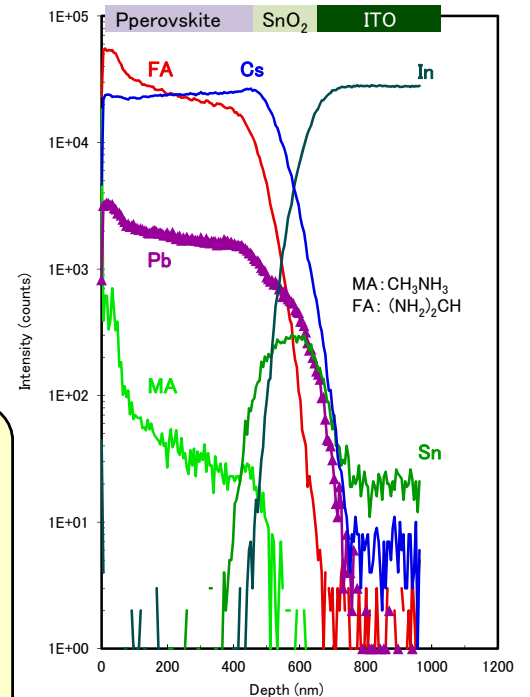


From the results of D-SIMS depth measurement, the high intensity of C, N, Br, I, and Pb elements on the surface side of the perovskite layer may be higher than that of the inside.

GCIB: Ar-gas cluster ion beam

From the results of GCIB-TOF-SIMS depth measurement, it is inferred that MA component in the upper part of the perovskite layer is localized more than FA component.

## GCIB-TOF-SIMS depth profile



Sample was provided by Dr. Wakamiya, Kyoto univ., Japan

The combination of EDX line profile, SIMS depth profile and TOF-SIMS is very helpful for the improvement of process, materials and devices of PSC.