In situ RBS/NRA analysis for Li depth profile in solid state electrolyte

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Solid-state Li batteries are one of the most promising candidates for the next generation batteries. Extensive investigations have been carried out to pursue higher energy density and safety. To launch solid-state Li batteries into the market, however, fundamental research is still needed to understand the mechanism of Li-ion transportation in a solid electrolyte.

A variety of analysis techniques are necessary to evaluate the property of solid-state electrolyte. In particular, *in situ* measurements of the depth profile of Li concentration in a solid electrolyte provide us with important information.

In this study, we have investigated the applied-voltage-dependent depth profile of Li concentration in a solid electrolyte, using Rutherford backscattering (RBS) and nuclear reaction analysis (NRA). A $Li_{1.5}Al_{0.5}Ge_{1.5}P_3O_{12}$ (LAGP) pellet with Au electrodes on both sides are used as a sample. Surprisingly, our results show that the Li-ion is depleted and accumulated for *several μm* near the solid-electrolyte/electrode interface, depending on the polarity of bias voltages. We have also measured the alternating-current (AC) impedance spectra. The details will be presented in the poster.

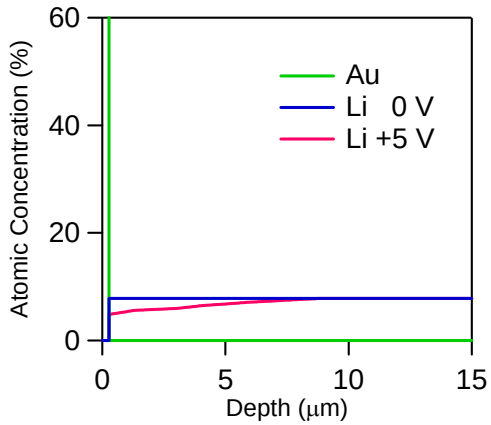

Fig1. Li depth profile of LAGP under voltage application