

*Current status of iMATERIA and recent result of LIB research*Toru Ishigaki¹, Akinori Hoshikawa¹, Yukihiro Yoshida¹, Takeshi Matsukawa¹, Yusuke Onuki¹¹Frontier Research Center For Applied Nuclear Sciences, Ibaraki University, Tokai, Japan

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Ibaraki prefecture, local government of Japan's area where the J-PARC sites are located, has decided to build a versatile neutron diffractometer (IBARAKI Materials Design Diffractometer, iMATERIA [1]) to promote industrial applications for the neutron beam in J-PARC. iMATERIA is planned to be a high-throughput diffractometer that could be used by materials engineers and scientists in their materials development work like the chemical analytical instruments. It covers the d in range $0.18 < d (\text{\AA}) < 5$ with $\Delta d/d = 0.16\%$ at high resolution bank, and $5 < d (\text{\AA}) < 800$ with the resolution changing gradually at three detector banks of 90 degree, low angle and small angle. So, this diffractometer covers very wide d -range ($0.18 < d (\text{\AA}) < 800$). All of the four banks, include small-angle bank are user operational. It takes about 5 minutes (DF mode) to obtain a 'Rietveld-quality' data in the high-resolution bank at 500 kW beam power for about 1 g of standard oxide samples. The automatic sample changer is the most important sample environment for high-throughput experiments. Our automatic sample changer [2] consists of sample storage, elevating system of two lines, two sets of pre-vacuum chambers and a sample sorting system. We can handle more than 600 samples continuously at room temperature without breaking the vacuum of the sample chamber. The main aim for this instrument is open for industrial users. Ibaraki prefecture is preparing many application systems, such as monthly apply system (a general proposal), mail in service, etc. for industrial users. Therefore, about 50 % of industrial users of MLF is iMATERIA users. Neutron diffraction technique can be determined the position of Li and O, precisely. The LIB materials are one of suitable materials for neutron diffraction study. Therefore, many experiments has been carried out by not only academic users but also industrial users. In this presentation, we will introduce some example of study for LIB materials.

[1] T. Ishigaki et. al., (2009) Nucl. Instr. Meth. Phys. Res. A, 600, 189-191.

[2] A. Hoshikawa et. al., (2010) J. Phys.: Conf. Ser. 251 012083-.

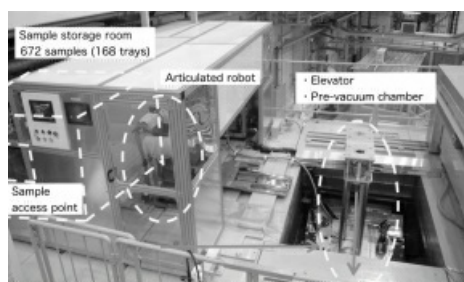


Fig. Overview of automatic sample changer of iMATERIA. There are sample storage, articulated robot and elevating systems from left to right.

Keywords: [Neutron diffractometer](#), [Powder diffraction](#), [Li ion battery](#)