

## Microsymposium

**MS79.O02**

### *In operando and wide-d neutron diffraction measurements at J-PARC*

T. Ishigaki<sup>1</sup>, M. Yonemura<sup>2</sup>, A. Hoshikawa<sup>1</sup>, Y. Yoshida<sup>1</sup>, T. Matsukawa<sup>1</sup>, S. Torii<sup>2</sup>, T. Kamiyama<sup>2</sup>

<sup>1</sup>Ibaraki University, Frontier Research Center for Applied Nuclear Sciences, Tokai, Japan, <sup>2</sup>KEK, Neutron Science Laboratory, Tokai, Japan

Since the operation start for J-PARC/MLF at 2008, neutron diffraction experiment using high intensity pulse neutron beam became possible. For example, if there are 1g typical oxide samples, it is possible to get one diffraction pattern in about ten minutes for 'Rietveld-analysis-quality' at iMATERIA. Four neutron powder diffractometer, iMATERIA (IBARAKI Materials Design Diffractometer[1]), SPICA (special environment powder diffractometer dedicated for battery study), SuperHRPD (Super high resolution powder diffractometer,  $d/d = 0.03\%$ ) and NOVA (high intensity total scattering diffractometer) are operating at J-PARC/MLF. In our previous neutron facility, the neutron intensity is not so strong to carry out routinely in operando neutron diffraction experiments. In J-PARC, however, it became possible to measure quickly changing neutron diffraction patterns in operando condition. iMATERIA is a versatile neutron diffractometer funded by Ibaraki prefecture for industrial application. In iMATERIA, Some user group was trying to in-situ measurements for battery. SPICA is optimized for an in operando neutron diffraction study to clarify the structural changes of battery materials at the atomic level. It has already typical results of time resolved measurements for a commercialized Li-ion battery. The structural changes of the material, which is dependent on the lithium content, were clearly observed. We will report the status of J-PARC/MLF diffractometers and recent result of in operando experiments.

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

**Keywords:** Neutron diffraction, Powder diffraction, in operando neutron diffraction study