

## Current State and Future Prospect of Novel Neutron Reflectometer at BL16 in J-PARC/MLF

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A horizontal-type neutron reflectometer ARISA-II placed at BL16 in J-PARC/MLF has been open for use until the end of 2010. ARISA-II equipped T0 and disk choppers, and 2-dimensional scintillation detector. Owing to these attachments, ARISA-II has successfully obtained not only specular reflectivity with low background noise but off-specular reflectivity. However, although two downward neutron beams with 2.22 and 5.71 deg are introduced at BL16 for wide scattering vector ( $q$ ) measurements on a free liquid surface, we can use only a single beam of 2.22 deg in ARISA-II, because of limited strokes of the components such as slits, sample and detector stages. Additionally, since ARISA-II was not designed for measurements with small sample area, slit collimation was not enough, where the minimum slit width in vertical direction was c.a. 0.1 mm.

In order to overcome the disadvantages of ARISA-II and upgrade furthermore, we are developing an advanced neutron reflectometer with horizontal geometry at the beamline. This new reflectometer will be installed in the end of 2010.

The reflectometer corresponds to both of the downward beams by extension of the vertical strokes of each component. The neutron beam coming from a liquid H<sub>2</sub> moderator of J-PARC passes through the T0 and disk choppers in front of iron collimators. After that, the beam is finely collimated by pair of computer-controlled slits, and irradiated on a sample. The reflected neutrons are counted on the 2-dimensional scintillation detector. Each slit width in vertical direction is narrowed down to 10  $\mu\text{m}$ , which provide us a beam with dimension of micrometer. Using the micro-sized beam, we can reduce a sample area down to about 10 mm  $\times$  10 mm. Furthermore, we introduce a neutron focusing mirror between the slits, which can focus the neutrons within around 1 mm and suppress loss of neutron flux originated from its divergence. It plays a role in obtaining fair reflectivity profiles at shorter duration. Also, the mirror enables us to make grazing incident small angle neutron scattering (GISANS) measurements with a high angular resolution by focusing on a detector plane.

We are also going to line up various kinds of sample cells such as liquid trough, temperature control cell and so on for measurements under on-demand circumstances. Especially, in combination with the 5.71 deg beam, the reflectometer provides measurements on liquid surfaces over wide  $q$  range (up to c.a. 0.56  $\text{\AA}^{-1}$ ).

On the presentation, we demonstrate the current state of the reflectometer and discuss on its specification and possibilities.