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Recent Activity of KUMASANS

Y. Oba[1], M. Hino[1], T. Oda[1], M. Ohnuma[2], N. Sato[1], R. Inoue[1], and M. Sugiyama[1]
[1]Kyoto University, Kumatori, Japan
[2]Hokkaido University, Sapporo, Japan
E-mail: oba@rri.kyoto-u.ac.jp

The biggest problem in small-angle neutron scattering (SANS) is a limited number of instruments. For solving this problem, compact neutron source plays a key role. In Japan, there are several compact neutron sources intended for neutron scattering experiments. At Hokkaido University Neutron Source (HUNS), various pulsed neutron imaging experiments are conducted and a SANS instrument is developed [1]. RIKEN Accelerator-driven Neutron Source (RANS) performs neutron diffraction and also plans to construct a SANS instrument. These facilities revealed that the neutron beam supplied by the compact neutron source is valuable for SANS. In this report, a recent activity to investigate the possibility of SANS at Kyoto University Research Reactor (KUR) was presented. Although KUR is not the compact neutron source, its flexible neutron guide hall is useful for such investigation.

Several SANS components are examined for possible use at the compact neutron source using the SANS instrument KUMASANS installed at KUR [2]. Since neutron velocity selectors used at general SANS instruments are too big and require heavy maintenance, a double-reflection Ni-Ti multilayer was selected. For magnetic materials, a permanent sample magnet was prepared instead of an electromagnet. To reduce background scattering, a sample vacuum chamber was installed. There are no vacuum window and no air section after the first slit. Several experiments of various materials were performed and confirmed that the updated components were properly worked.

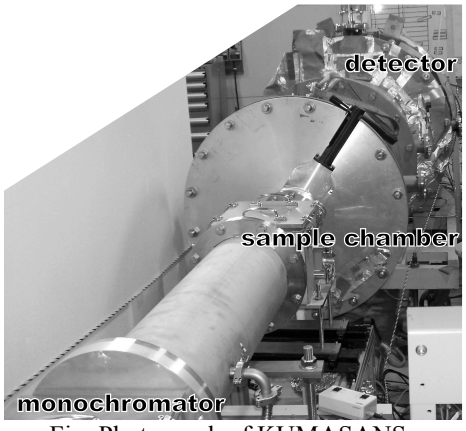

Fig. Photograph of KUMASANS.

Further improvement is going on. To efficiently use the vertically elongated incident beam, a focusing device is under consideration. We are also planning to prepare a Peltier temperature controller used in vacuum.

[1] M. Furusaka, H. Sato, T. Kamiyama, M. Ohnuma, and Y. Kiyanagi, Physics Procedia 60, 167 (2014).
[2] M. Sugiyama and Y. Maeda, Jpn. J. Appl. Phys. 33, 6496 (1994).