

Advanced KINKEN Triple-Axis Neutron Spectrometer, AKANE

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We have completed the renewal of the former double-axis diffractometer (KSD), and reconstructed it to a conventional triple-axis spectrometer, AKANE, last year. As a second phase of renovation, we began to improve its performance, in particular, toward inelastic neutron scattering measurements. This year, we set up a new Ge (311) monochromator in order to gain high-flux neutron beam. As shown in Fig. 1(a), the new [previous] monochromator has the following specifications: (i) 20-cm height [10 cm], (ii) 13 blades with each vertical size of 1.5 cm [5 blades with 2-cm height each] and (iii) tunable vertical focus [a fixed bent]. As a consequence of these features, the beam focus is improved in space and a high luminescence is produced at the sample position. Figure 1(b) actually shows that the phonon intensity increases double with keeping the resolution as well as the S/N ratio.

In addition to the conventional triple-axis mode, AKANE has several options. First, a horizontally focused supermirror can be inserted in the incident beam path. Second, a position-sensitive-detector bank can be set up after a sample under the double-axis mode. A combination of these new equipments has an advantage for taking diffraction patterns over a wide Q range in short time by using a small crystal. Further, Ohoyama et al. performed magnetic neutron diffraction experiments under 30-T pulsed magnetic fields on AKANE using a small MnF₂ single crystal. In fact, they succeeded in detection of magnetic signals, which indicates a spin-flop transition under high fields. Thus, AKANE is challenging to develop new techniques of neutron scattering.

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Table 1. Specification of AKANE

○ Monochromator Ge(311) vertical focus (tunable) $\eta M = 10'$ $\lambda = 2.0 \text{ \AA}$, $\lambda/2 : < 0.1\%$ without filters
○ Analyzer PG(002) vertical & horizontal bent PG(002) flat
○ Detector He ³ proportional detectors Pseudo two-dimensional PSD bank

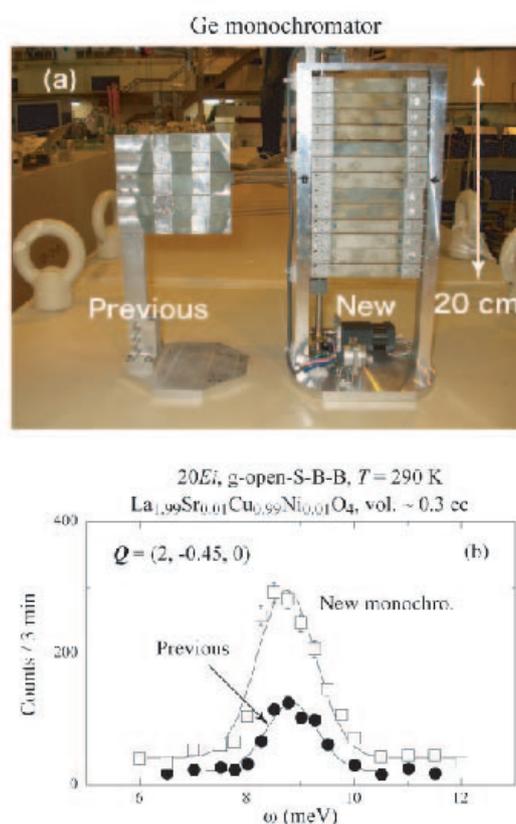


Fig. 1. (a) Previous and new Ge(311) monochromators. (b) Comparison of phonon intensity between the two cases of monochromators.