Single crystal X-ray diffraction of the phase transformation in solid C_{70}

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A total of 8 shifts of synchrotron beam time on public Beam Line BL02B1 was allotted and the above mentioned experiment was started from 15:00 hr on 12th Oct. 1998. In view of earlier discussion (via e-mail) with Prof. Y. Noda (Sub-Group Incharge of Phase Transition at the X-ray Diffraction Experimental Station BL02B1), it was decided to carry out a limited set of measurements. A C_{70} vapour transport grown single crystal of size $250\mu X\ 100\mu X 50\mu$ was chosen for these measurements. Beam energy was changed to 10 keV to suit our study and mounting the single crystal on the four-circle goniometer alignment took nearly 6 hours. The collimated beam size obtained at the sample was approximately 400μ in diameter. During this process we were helped by Dr. Ikeda, Spring-8, Prof. Ozawa and his student of Himeji Institute of Science and Technology, Japan. Thirteen Φ-oscillation pattern ($0 < \Delta\Phi < 8$) with suitable overlaps to cover an angular range of $0 < \Delta\Phi < 92$ deg were recorded. It took nearly 3½ hours to complete one set of measurement at one temperature including IP scanning time. To follow the orientational ordering transition of C_{70}, oscillation patterns were recorded at different temperatures using a low temperature attachment which was kindly provided by Prof. Ozawa. For want of time, judicious selection of six temperatures was made to cover the temperature region of interest for the C_{70} orientational ordering transition.

From the visual inspection of the oscillation pattern at different temperatures, structural transition of C_{70} associated with the orientational ordering could be seen. It is also noticed that due to parasitic scattering from the mounting epoxy and from the glass capillary, the background level was quite substantial requiring detailed data analysis. Further analysis of the imaging plate data is in progress.