Poster

Current Status of AIST X-ray-absorption-spectroscopy (XAFS) Instrument with 100-Pixel Superconducting-tunnel-junction Array Detector

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Fluorescence yield X-ray absorption spectroscopy (XAFS) in a soft X-ray region below 3 keV is important for the measurement of local structure around trace light element impurities in light element matrices. Our XAFS instrument with a 100-pixel STJ detector is now in the stage of routine operation and open to users at a synchrotron radiation facility (KEK PF). The STJ array detector has a structure for minimizing double peaks originating top and bottom electrode and other artifact events, which was reported in the previous LTD. The energy resolution distribution of the 100 pixels was improved from 18.3 eV (±4.2) to 11.8 eV (±0.6) at 400 eV in a sensitive area of 1 mm^2. The energy resolution is very uniform over the entire array, and very stable for daylong measurement because STJs having an energy gap are insensitive to base temperature drift. The performance of a 4 mm^2 detector is poor and should be improved. As an example of functional materials, we successfully measured nitrogen K-edge XAFS spectra of a compound semiconductor, 4H-SiC, with a nitrogen dopant density of 300 ppm by clearly separating the faint N-Kα line and the strong C-Kα line.