

Poster

Toward 1000-pixel Superconducting-tunnel-junction Detectors for X-ray Absorption Fine Structure Spectroscopy

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X-ray detectors based on superconducting tunnel junctions (STJs) have demonstrated excellent energy resolution, high detection efficiency, and high counting rate in the soft X-ray energy range, which is suitable for synchrotron radiation facilities. Our soft X-ray spectrometer using 100-pixel array of Nb/Al/AlO_x/Al/Nb STJs with 100 μm square has a mean energy resolution of 12 eV and a counting rate of several 100 k cps, and is now open to users for routine analyses. It is possible to measure XAFS spectra of nitrogen dopants of 300 ppm in a SiC compound semiconductor. However, in order to achieve a high throughput analysis for dopants with a lower concentration, the pixel number of STJ array detectors should be further increased to enlarge the sensitive area. As a first step, we have fabricated 400-pixel STJ array detectors and checked the uniformity of leak current. The leak check was performed by connecting four STJ in series, since the number of wiring of our cryostat is limited to 200. Typical four-series STJs showed excellent I-V curves having a subgap current less than 4 nA at 1.6 mV. This subgap current is equivalent to that of the 100 STJ array detector with the 12 eV energy resolution.