

An X-ray TES detector head for high-precision composition analysis

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The detector head, to be installed to the STEM-EDS-TES (Scanning Transmission Electron Microscope with Energy-Dispersive Spectroscopy using a Transition Edge Sensor) system under development (Maehata et al. in this workshop), is a cooling stage to place the 8 x 8 TES array optimized for the system (Muramatsu et al. in this workshop) to the focal plane which is 13 cm away from the mixing chamber in a horizontal direction. The detector head consists of a main copper rod which has 416 three-dimensional superconductive wirings deposited onto it, the TES array mounted onto the tip of the rod, 8 low-power SQUID chips (Sakai et al. submitted to IEEE Trans.) and 12 connectors on the surfaces of the rod (see attached figure). We developed a three-dimensional "flip-chip" assembly technology for mounting the SQUIDS and established a method for obtaining stable electrical connections in a cryogenic environment. We present the details of the assembly method and an X-ray irradiation test with the detector head toward the demonstration of the STEM-EDS-TES system.

