



## Gamma-ray Transition-Edge Sensor microcalorimeters on Solid Substrates

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We are developing Transition-Edge-Sensor (TES) microcalorimeters for gamma-ray detection. In order to develop mechanically robust detectors, we have deposited a TES thermometer on a silicon substrate without a membrane structure and glued an absorber on it. We have fabricated a device with a bismuth absorber and a device with a tin absorber. The volume of each absorber was 0.5 mm x 1 mm x 1 mm. We have cooled the detectors and irradiated them by gamma rays from cesium 137 and observed two types of pulses: pulses with fast rise and pulses with slow rise. The fast pulses are signals due to Compton scatterings in the silicon substrate and the slow pulses are the signals from the gamma rays absorbed or scattered in the absorbers. We have selected the slow pulses to obtain energy spectra. The energy resolutions of the 662-keV photo peak of the bismuth device and tin device were 4.1 keV and 7.5 keV, while their baseline energy resolutions were 3.2 keV and 2.6 keV, respectively.