Kilopixel X-ray Microcalorimeter Arrays for Astrophysics: Device Performance and Uniformity

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We are developing kilo-pixel arrays of TES microcalorimeters to enable high-resolution X-ray imaging spectrometers for future X-ray observatories and laboratory astrophysics experiments. Our current array
design was targeted as a prototype for the X-ray Microcalorimeter Spectrometer proposed for the International X-ray Observatory, which calls for a 40x40-pixel core array of 300 micron devices with 2.5 eV energy resolution (at 6 keV). Here we present device characterization of our 32x32 arrays, including X-ray spectral performance of individual pixels within the array. We present our results in light of the understanding that our Mo/Au TESs act as weak superconducting links, causing the TES critical current (Ic) and transition shape to oscillate with applied magnetic field (B). We show Ic(B) measurements and discuss
the uniformity of these measurements across the array, as well as implications regarding the uniformity of device noise and response. In addition, we are working to reduce pixel-to-pixel electrical and thermal crosstalk; we present recent test results from an array that has microstrip wiring and an angle-evaporated Cu backside heatsinking layer,
which provides Cu coverage on the four sidewalls of the silicon wells beneath each pixel.