



## Electrical characteristics of superconducting Ti transition edge sensors

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Purple Mountain Observatory is planning to build a 5-m THz telescope (DATE5) targeting at 350mm and 200mm atmospheric windows at Dome A, Antarctic. An instrument for DATE5 will be a 32x32 pixel terahertz superconducting imaging array (TeSIA) based on transition edge sensors with time-domain multiplexing to meet the ground-based sensitivity limit of  $10^{-16} \text{W}/\text{Hz}^{0.5}$ .

We have designed and fabricated superconducting Ti transition edge sensors (TES) with different microbridge lengths varying from 1 mm to 6 mm. The thin Ti film is evaporated on a high-resistivity silicon substrate, with the microbridge patterned by optical lithography. The current-voltage characteristics of the fabricated Ti TESs are measured at different bath temperatures using commercial SQUID amplifiers. The thermal conductance (G) is found to be about  $300 \text{pW}/\text{K}$  for a 2mm long device. In addition, the effective response time measured with a pulse signal is about 3ms at a bias voltage of 9mV, and decreases with increasing the dc bias voltage because of negative electro-thermal feedback. The obtained electrical noise equivalent power (NEP) from its calculated current responsivity and measured current noise is about  $4 \times 10^{-17} \text{W}/\sqrt{\text{Hz}}$ , which is sufficiently low for TeSIA instrument.