

# Quartz Infrared Detectors

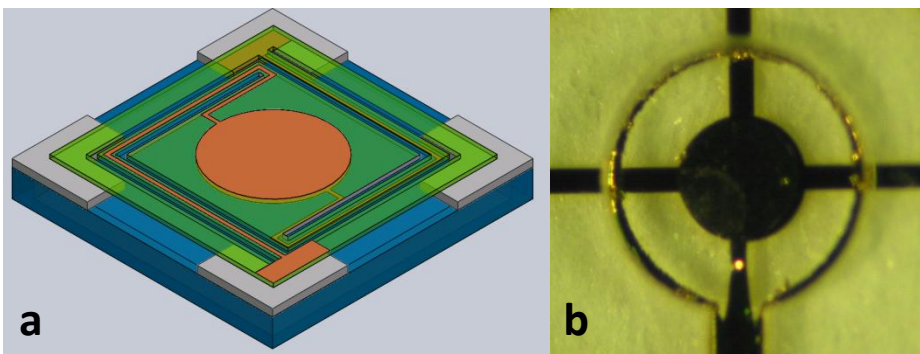
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## Motivation

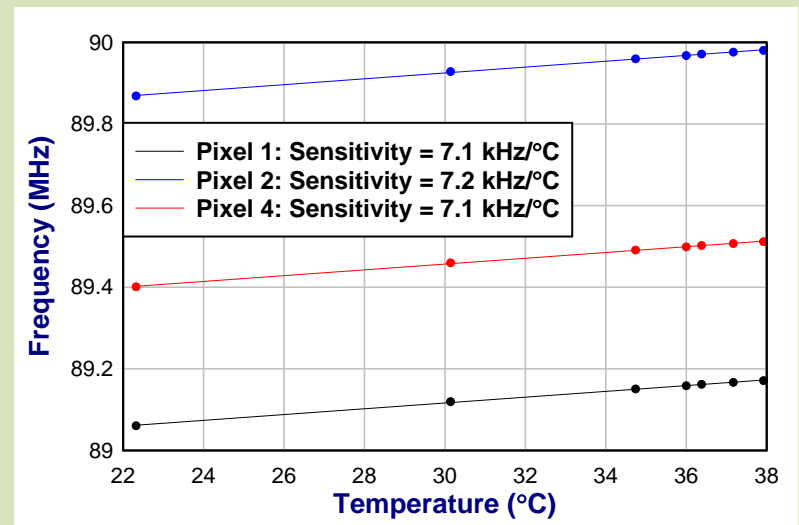
- Shear-mode quartz resonators made from certain crystal cuts can be used as very sensitive temperature sensors with unprecedented resolutions of up to  $10^{-6}$  °C.

## Project Status and Results

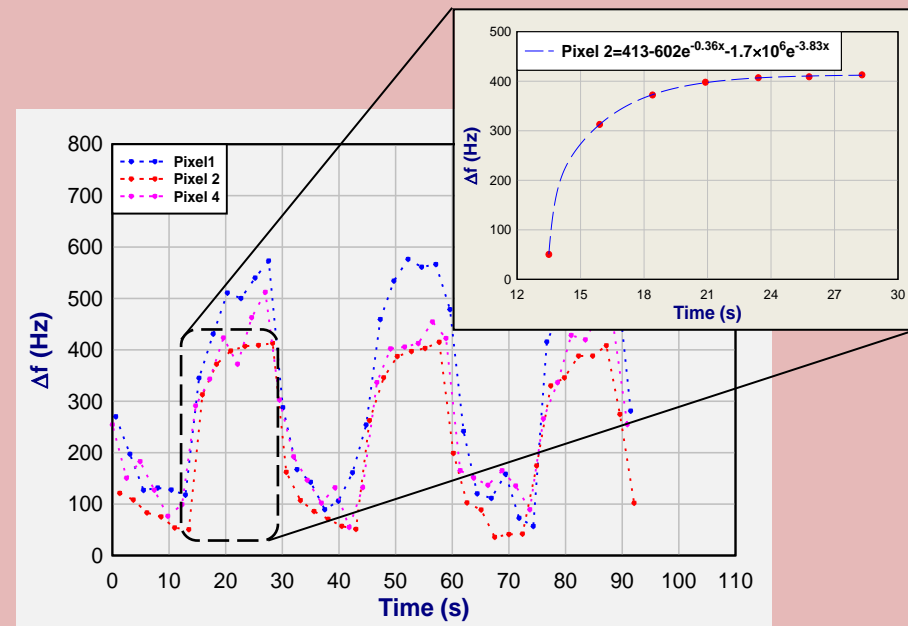
- Quartz resonator arrays with excellent resonance characteristics have been fabricated by RIE etching of quartz.
- Temperature sensitivity of 7.2 kHz/K was experimentally measured.
- Infrared calibration tests on the resonator array even without the use of infrared absorbers gave a responsivity of 14.3 MHz/W and an NEP of 326 nW.



(a) Schematic illustration of the IR Detector,  
(b) Optical Image of a Fabricated Pixel



Experimental Temperature Sensitivity of Quartz



Response of 3 quartz resonator pixels upon absorption of infrared radiation from a broad band lamp source modulated at a frequency of 33 mHz.