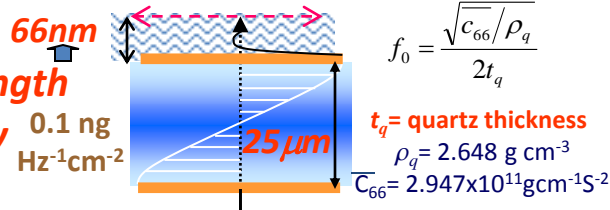


# Micromachined Quartz Resonators

Ping Kao, David Allara, Srinivas Tadigadapa

## Motivation

1. Short decay length
2. High sensitivity  $0.1 \text{ ng Hz}^{-1}\text{cm}^{-2}$
3. Multi pixels



Mass

Viscoelastic medium

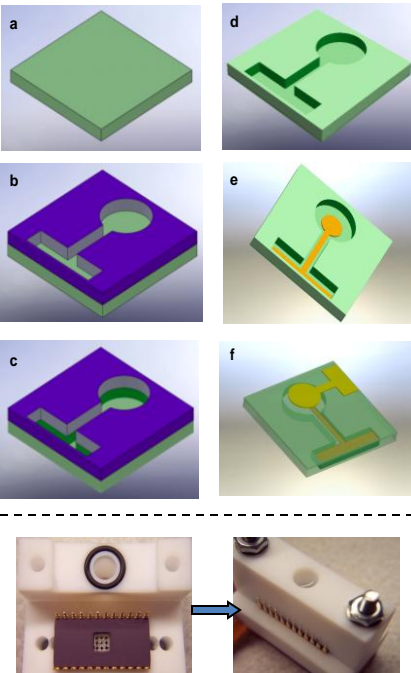
Fluid

Thin, rigid  
no slip condition



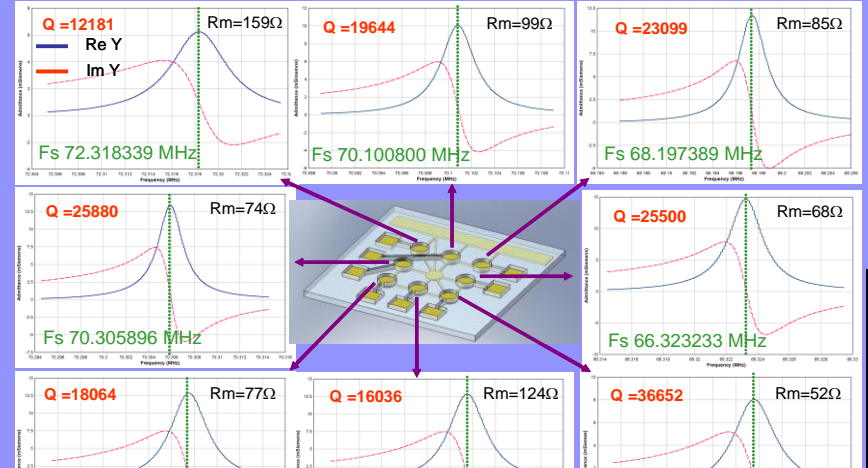
Semi-Infinite  
Newtonian fluid

## Fabrication

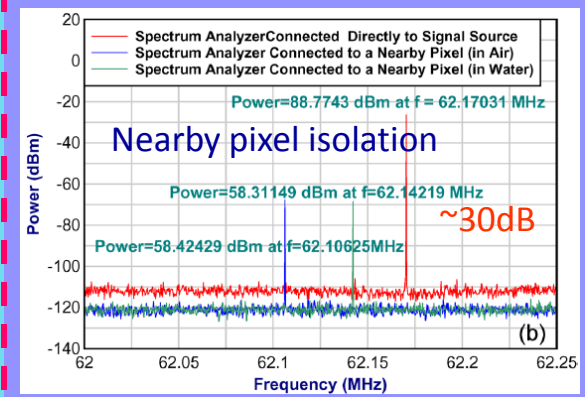
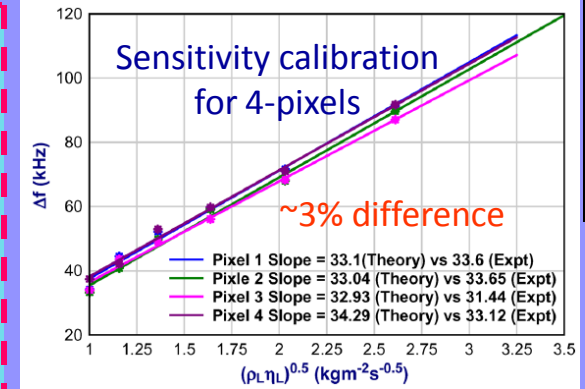
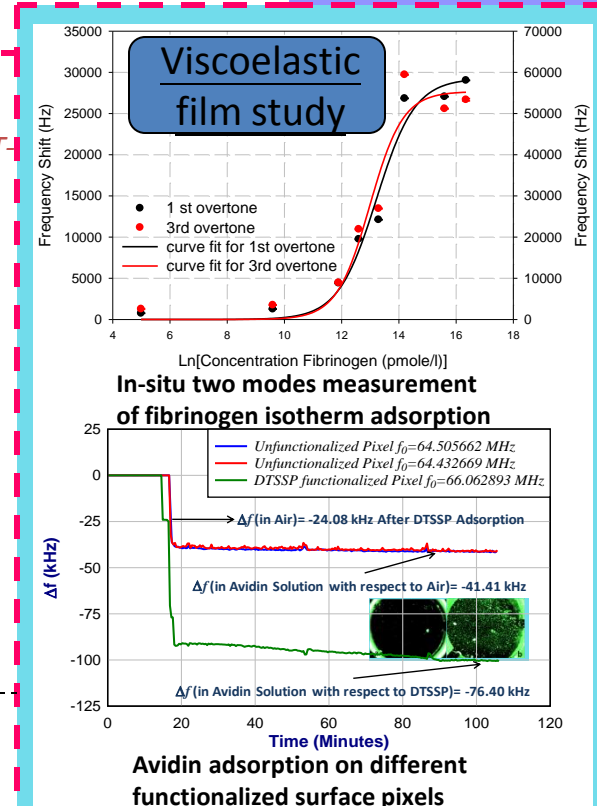


- 100mm thick AT-cut quartz
- Patterned 10mm thick nickel layer
- ICP etching of 75mm quartz
- Nickel hard mask strip
- Back side electrode patterning
- Front side electrode patterning

Packaged device in liquid test cell



Admittance characteristics of the 8-pixels in a resonator array



Device characterization