

Fiber-optic Photoacoustic Endoscopy

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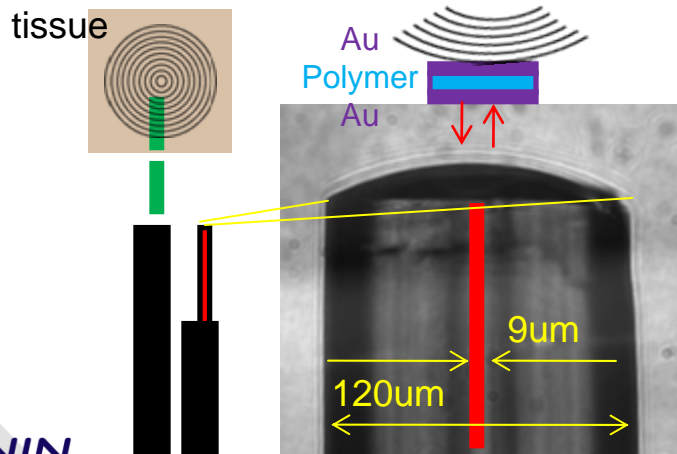
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NNIN Facility utilized: Nanofabrication Center

Objective: to create a miniature linear acoustic sensor array for photoacoustic endoscopy.

Deposit optical resonator (etalon) for acoustic detection on tip of optical fiber using e-beam evaporation

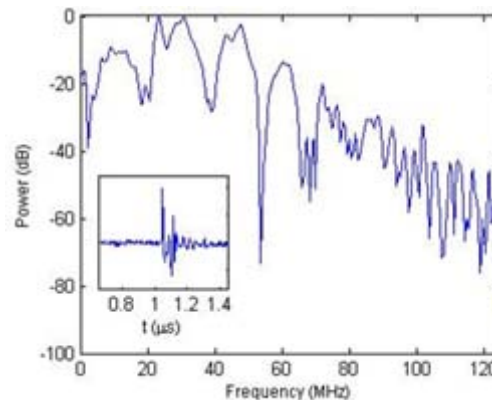
- ◆ Produce resonator on multiple fibers with additional fibers transmitting optical pulses for photoacoustic excitation.



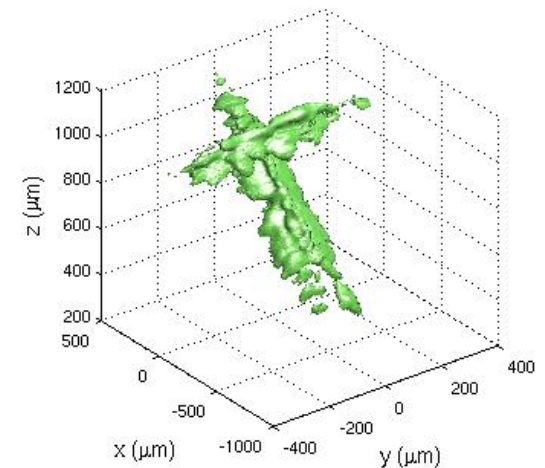
Major Observations

- ◆ Sensor exhibits optical resonance and compressibility suitable for opto-acoustic ultrasound detection at frequencies up to 50 MHz.
- ◆ Can image photoacoustic targets less than 100 μm in size which gives cause for developing a bundle of sensors.
- ◆ If fabrication is successful, device will ready to image live tissue, e.g. kidney tissue in rat.

Detection of ultrasound emitted from chromium thin-film irradiated with 532nm opt. pulse



Reconstruction of two strands of 60 μm black hair by scanning sensor to make synthetic aperture



Publications

- ◆ C. Sheaff, N. Lau, H. Patel, S. Huang, and S. Ashkenazi. *Photoacoustic Imaging Endoscope*, International Conference of the IEEE Engineering in Medicine and Biology Society, Minneapolis, MN, USA, September 2-6, 2009 (IEEE, 2009).