Novel and Diverse Applications of Silicon Nanosensors and Imagers

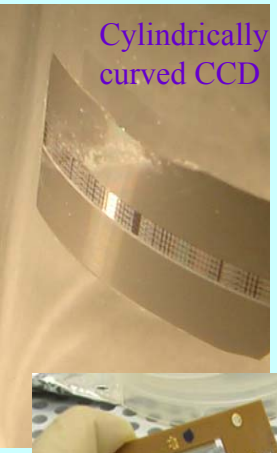
Blake Jacquot, Ph.D.
Member of Technical Staff
Jet Propulsion Laboratories
April 28, 2009

National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

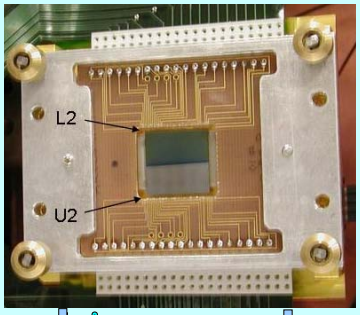
www.nasa.gov

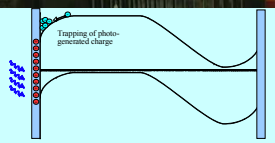
Advanced Detector Arrays and Nanoscience Group

Cylindrically curved CCD

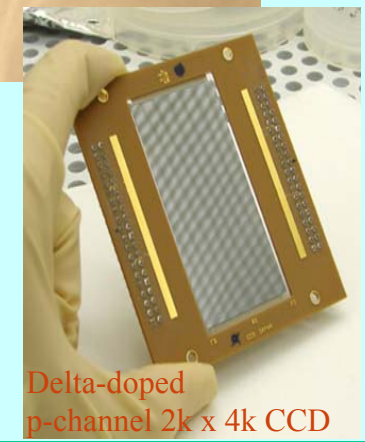


Back illuminated Si UV/Vis/NIR Imagers

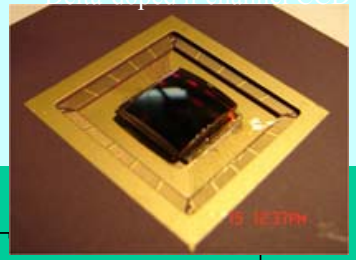




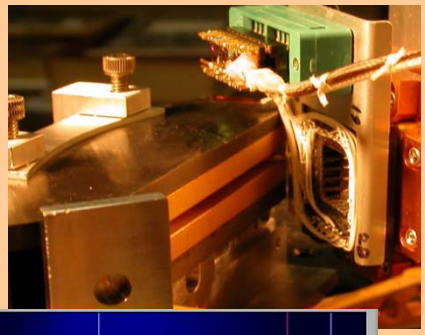
Delta-doped n-channel CCD

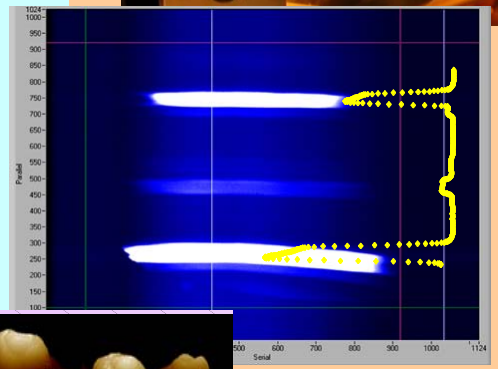


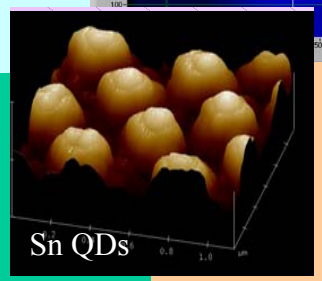
Delta-doped p-channel 2k x 4k CCD

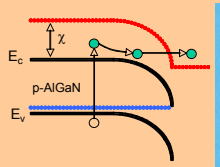


Particle Detectors

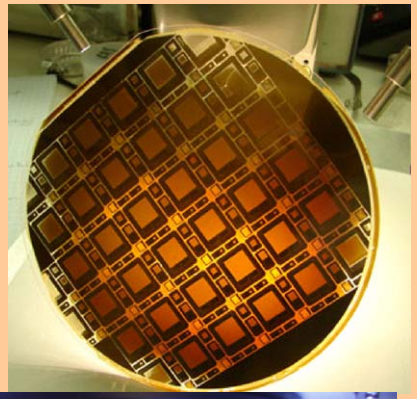


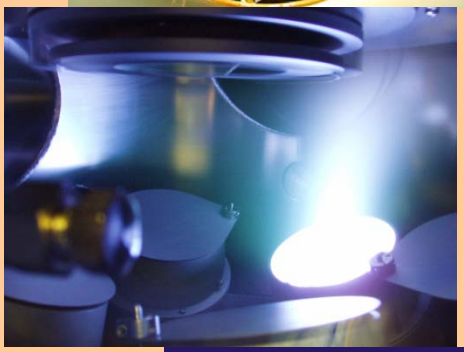


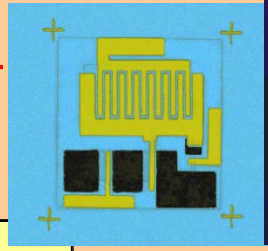


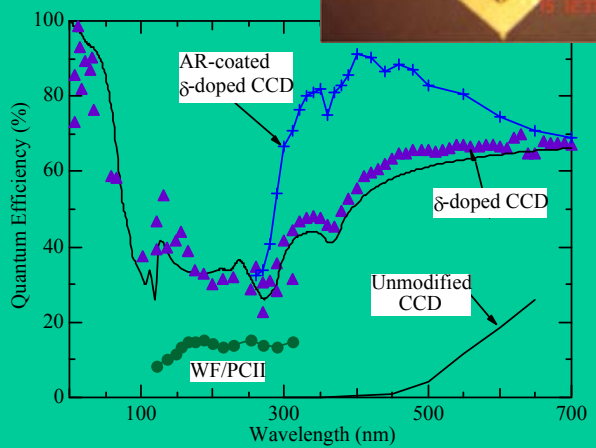


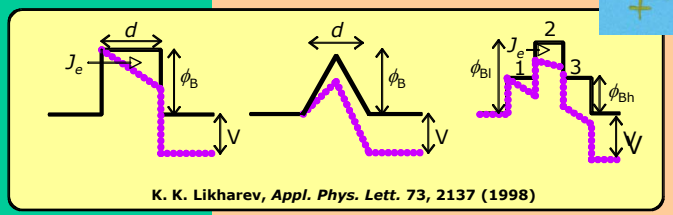
End-to-end Processing



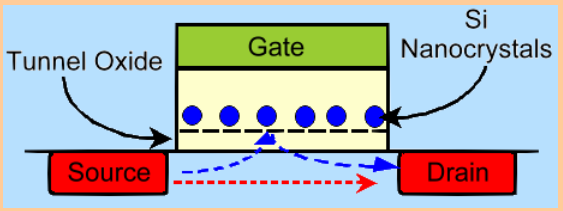






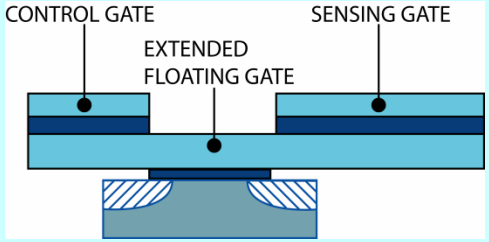


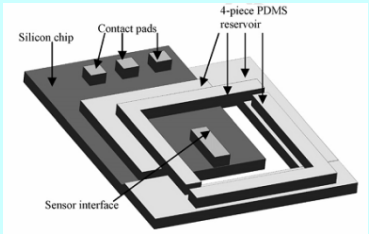
K. K. Likharev, *Appl. Phys. Lett.* 73, 2137 (1998)



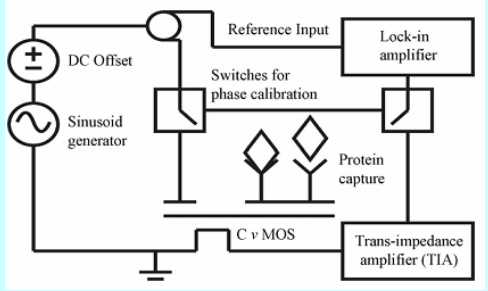
CνMOS: Charge-based sensors

CMOS-Based Biosensors

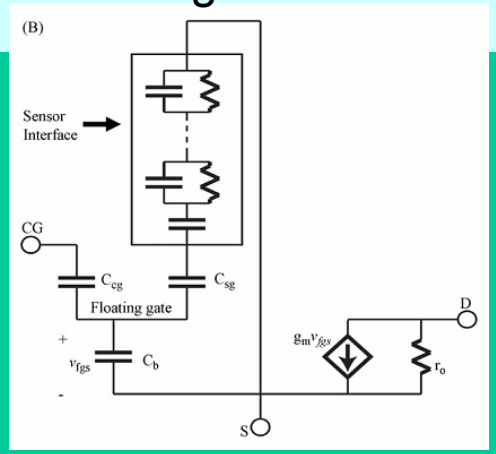




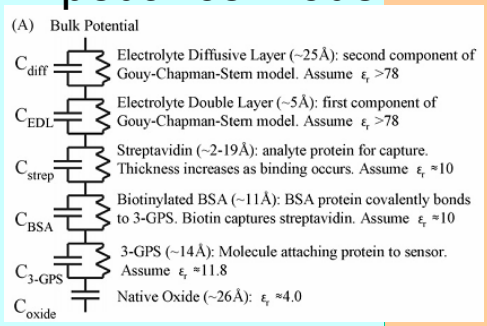
Measurement of Protein Binding



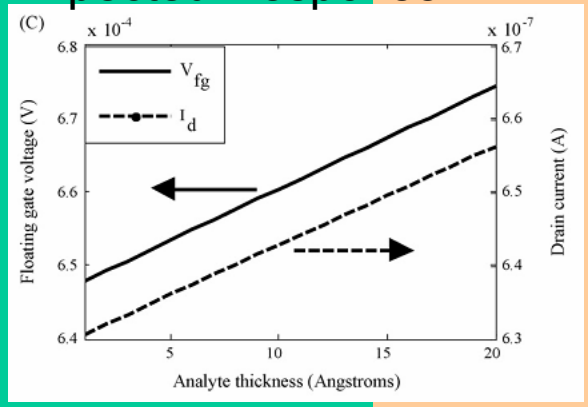
Small-Signal Model



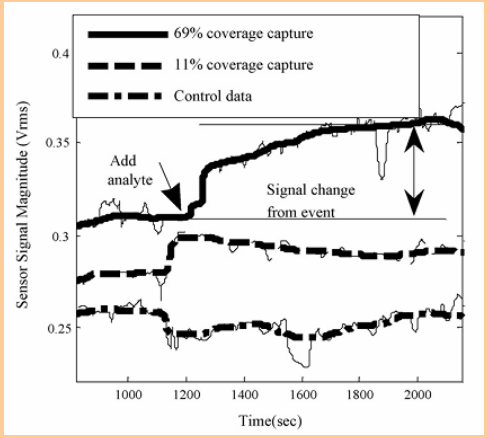
Impedance Model



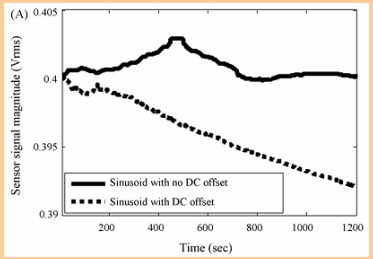
Expected Response



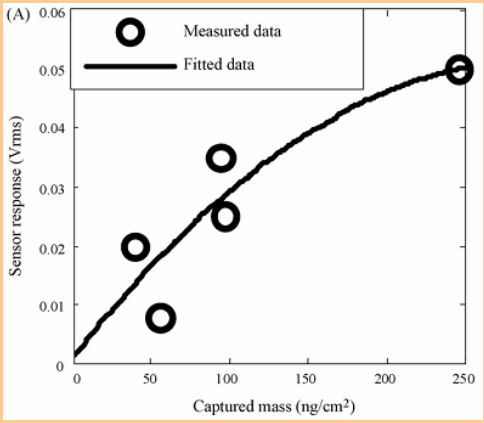
Real-Time Detection

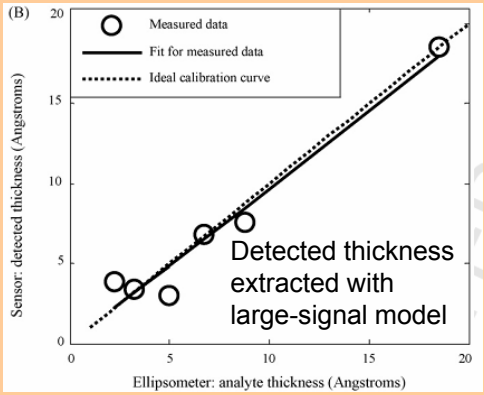


Low drift



Calibration Curves





- Detection limit: 25 ng/cm² or 2Å
- 1.5µm technology scaled down
- Different materials to block mobile ions

Cornell University

Jacquot, B.C., et al., Biosens. Bioelectron. (2008)