

520/530/580.495
Microfabrication Laboratory

and

520.773
Advanced Topics
In Fabrication and Microengineering

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Fabrication and Microengineering

- Is about the physical and chemical processes that are employed to design and manufacture highly integrated structures in silicon and other materials for sensing, actuating, computing and communications

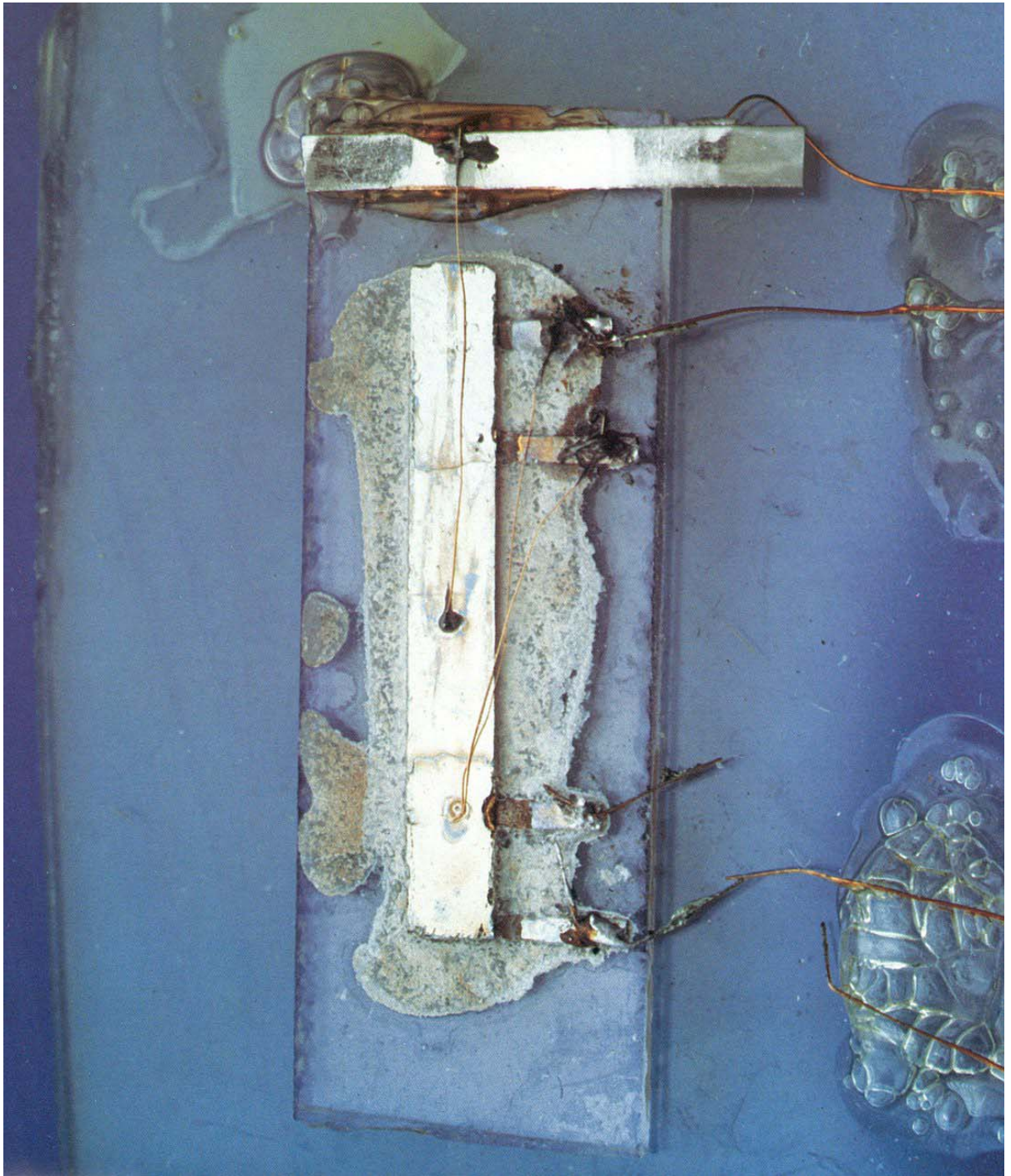
CMOS integrated circuits (analog and digital)

Microelectromechanical Systems (MEMS)

DNA Microarrays and Micro Total Analysis Systems

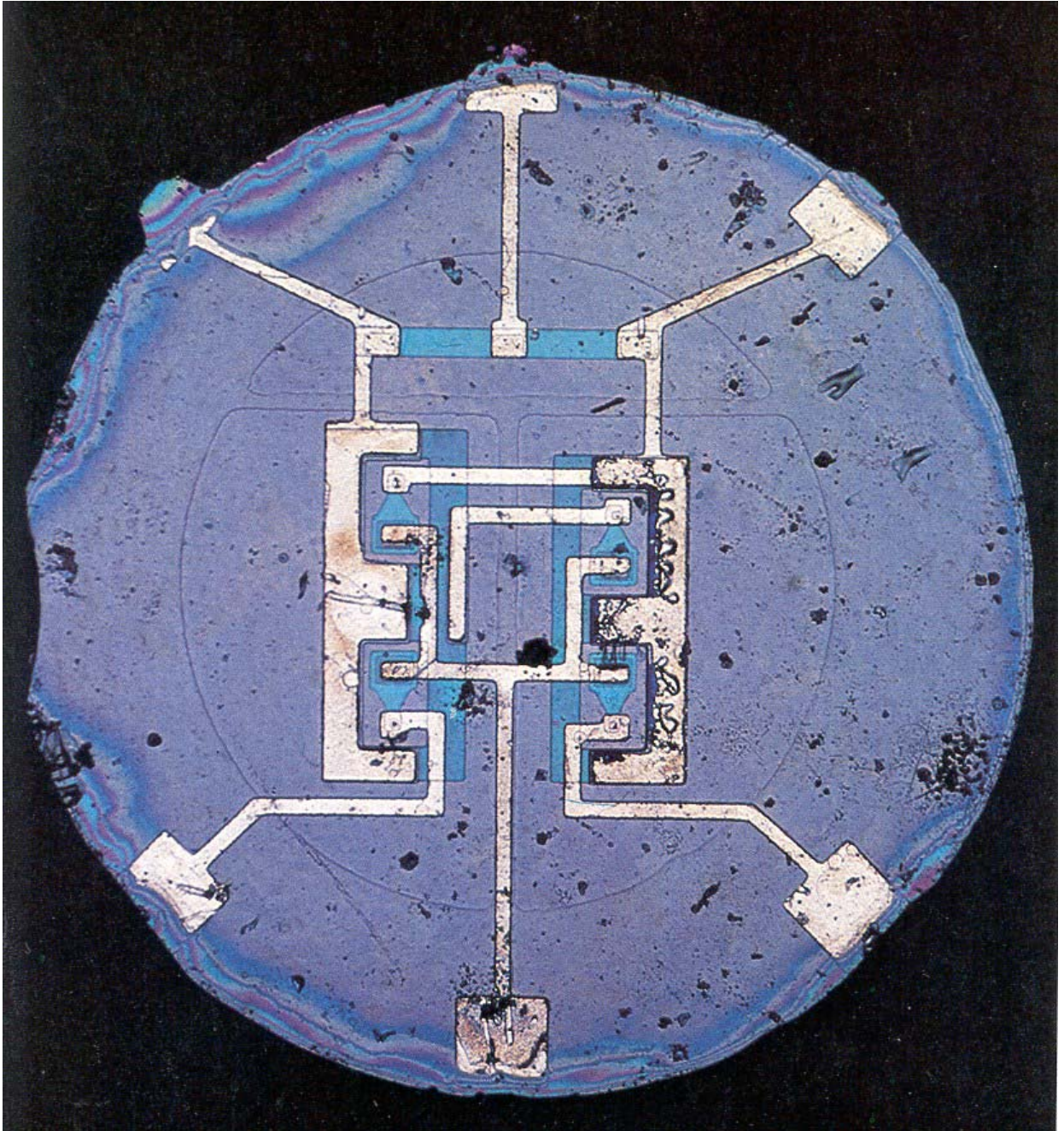
Synthetic Microstructures for Biological and Medical Research

Integrated Circuits (1958)



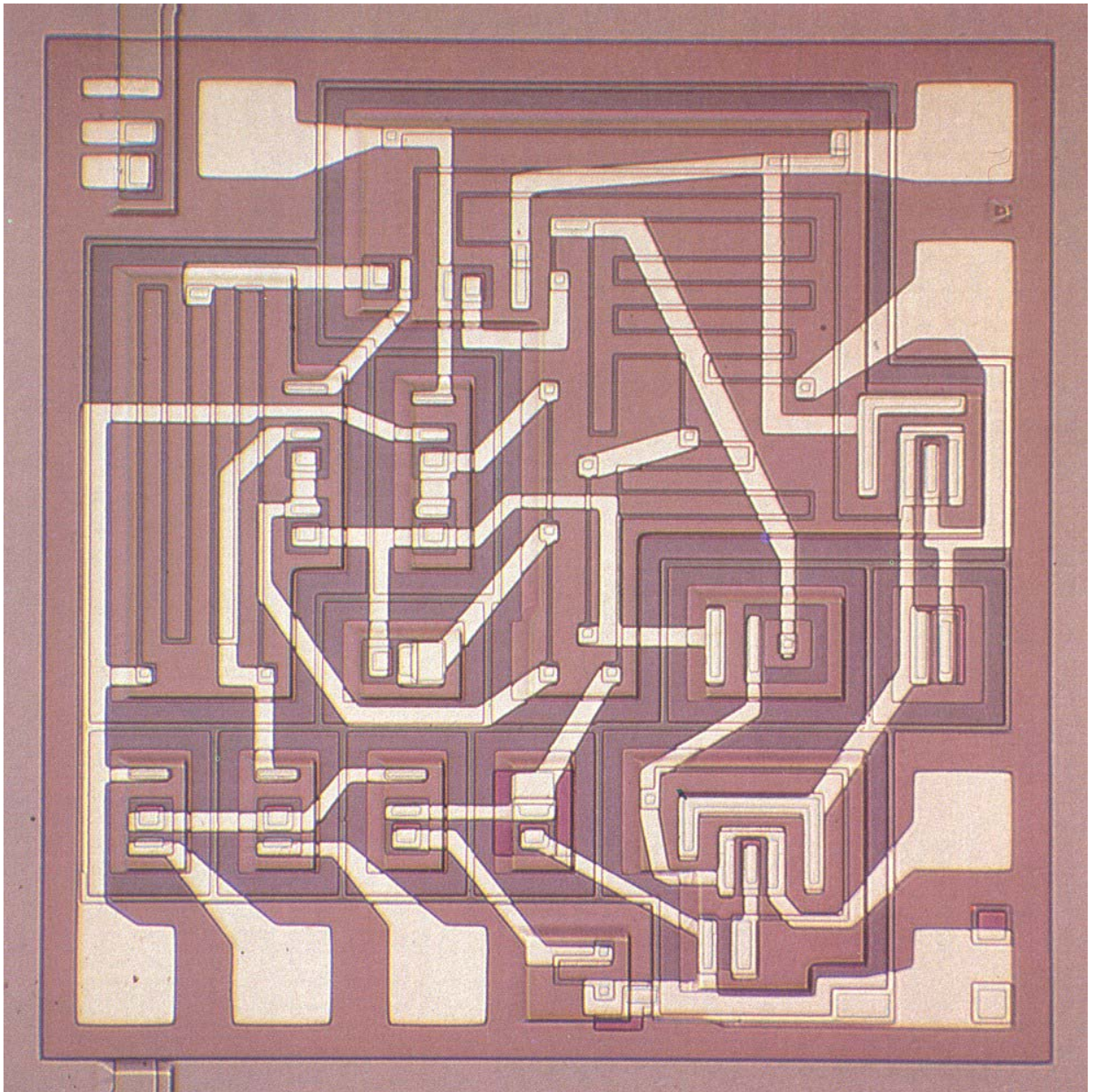
Jack Kilby Texas Instruments,
Phase Shift Oscillator

Planar Process (1962)



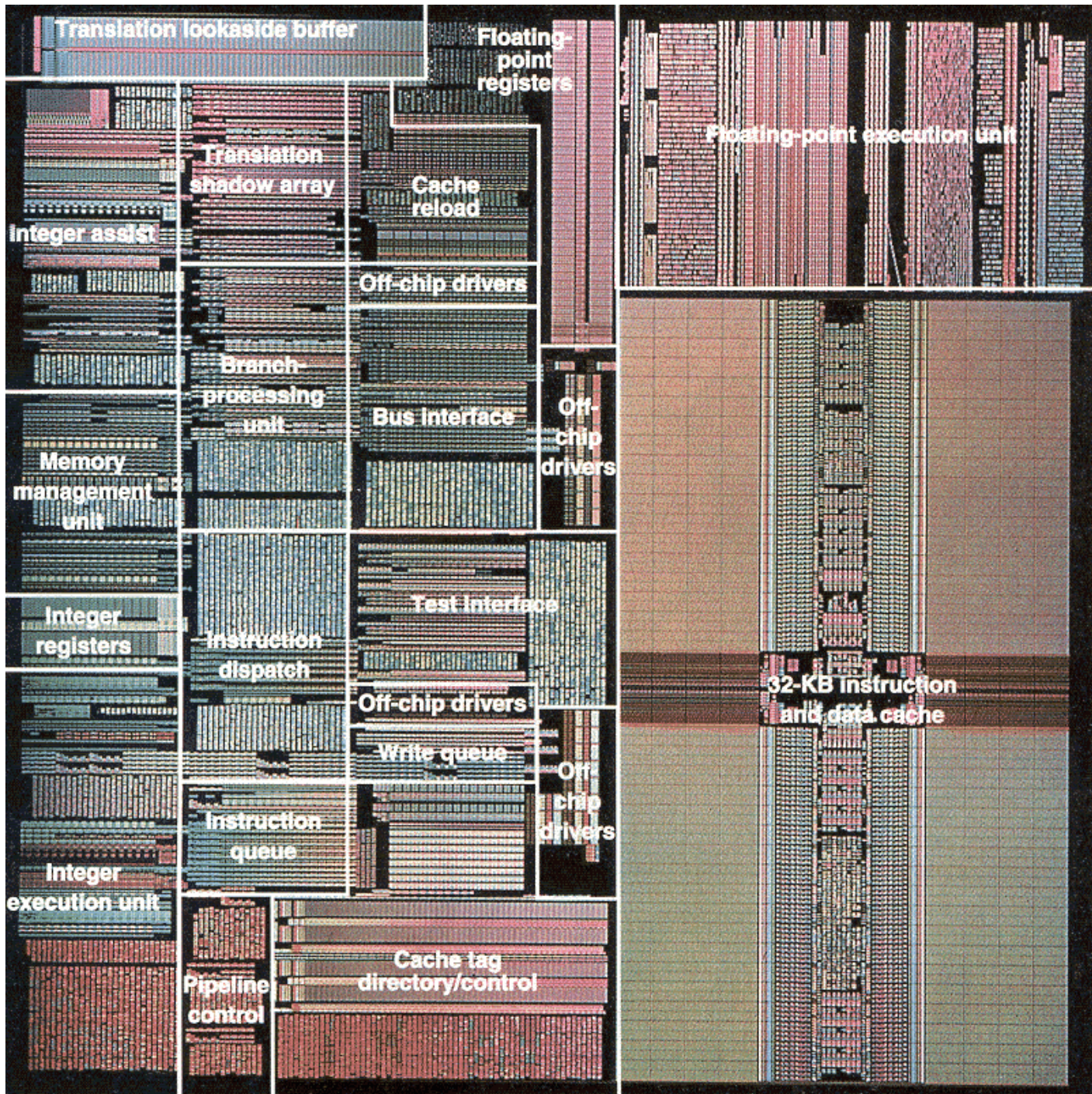
RTL Logic (Noyce and Hoerni)

Operational Amplifier (1965)



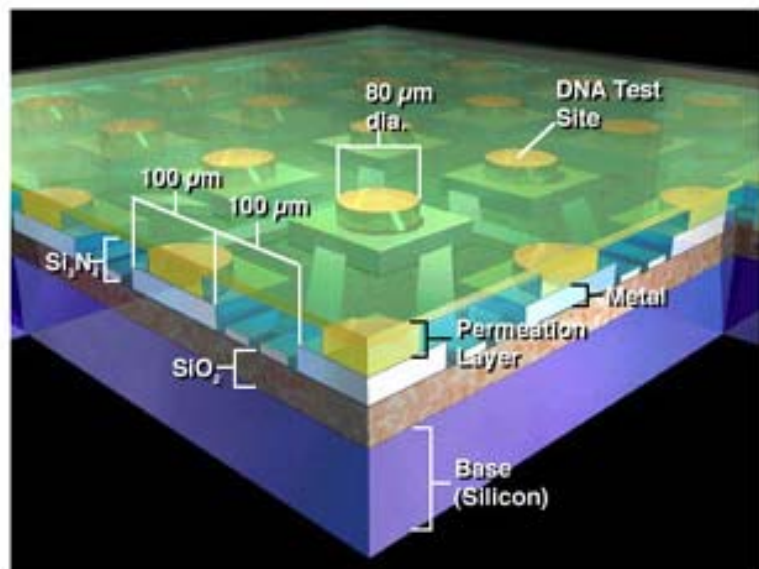
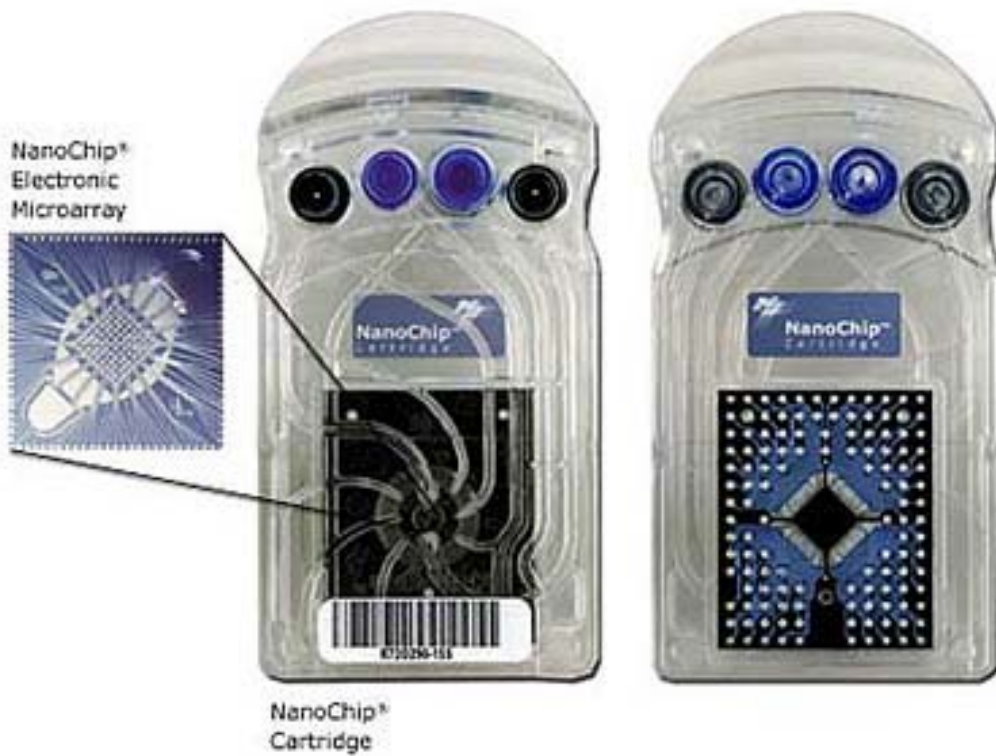
Fairchild ua 709

PowerPC



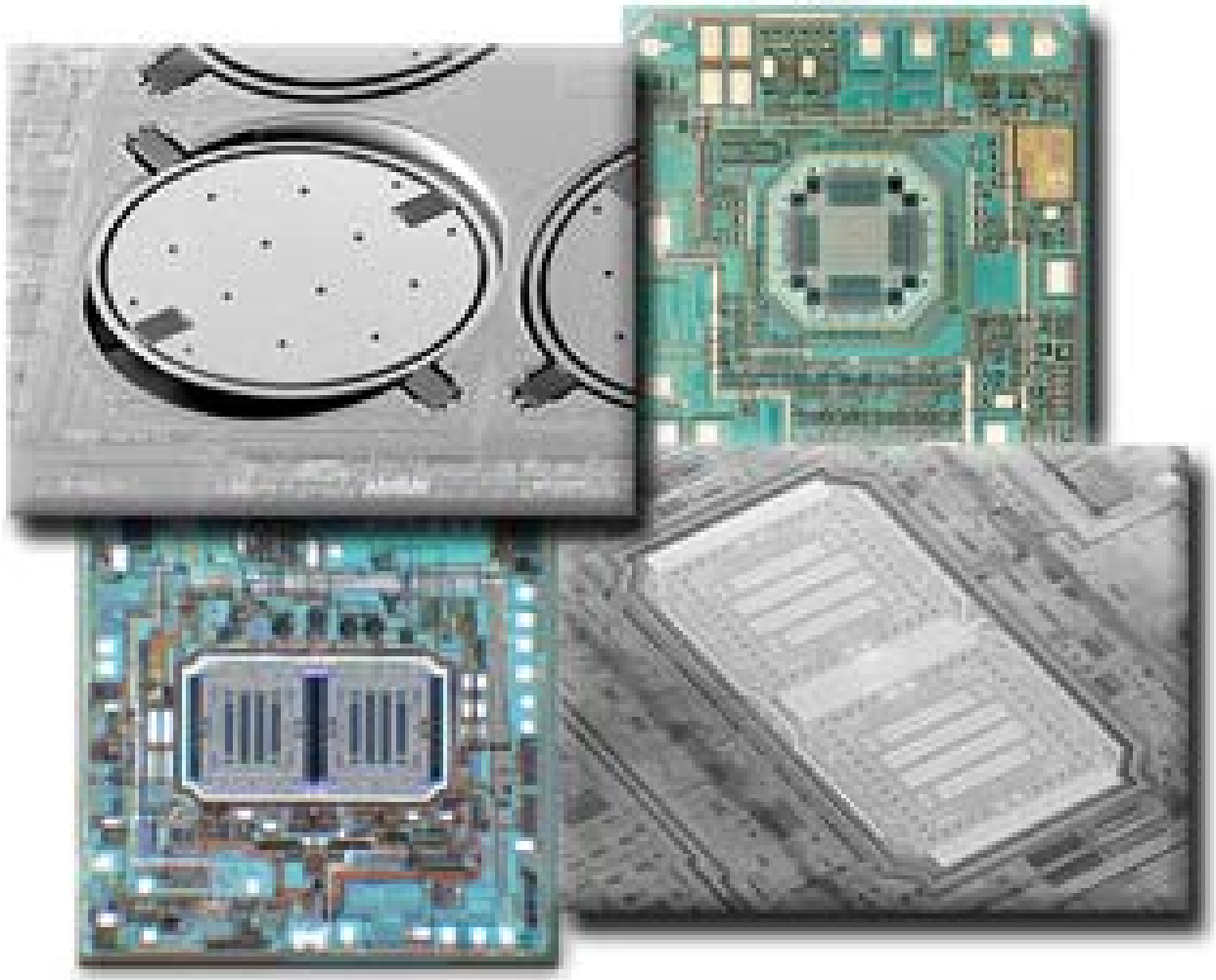
DNA MICROCHIPS

http://www.nanogen.com/products/nanochip_micro.htm



Analog Devices

Accelerometers and Gyroscopes



Industrial Success

- Analog Integrated Circuits

Key: Fabrication process improvements in bipolar or MOS/bipolar technologies

- Good parametric yield
- Reliability

- Very Large Scale Integrated Circuits

Key: Manage complexity in the number and connectivity of switches (MOS transistors)

- Integrated Micro-electromechanical Systems

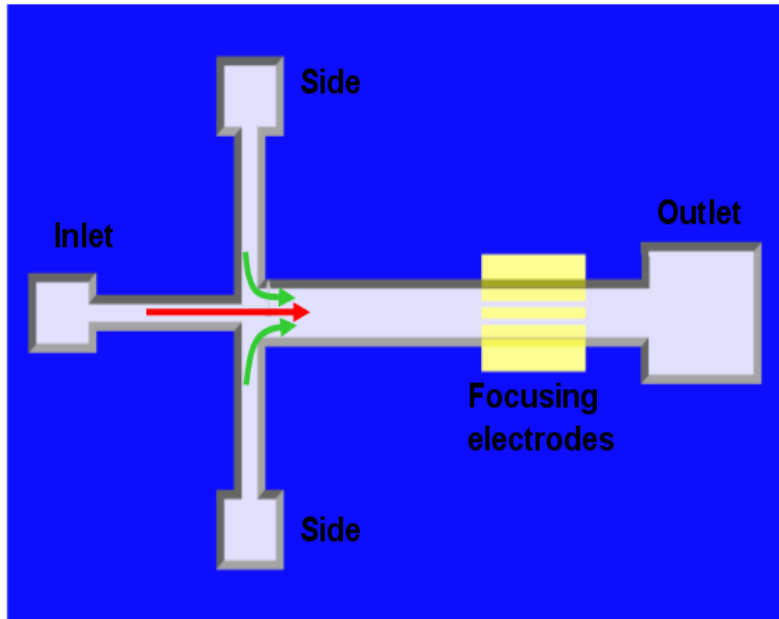
Key: Fabrication process augmentation to incorporate moving structures

Course Outline

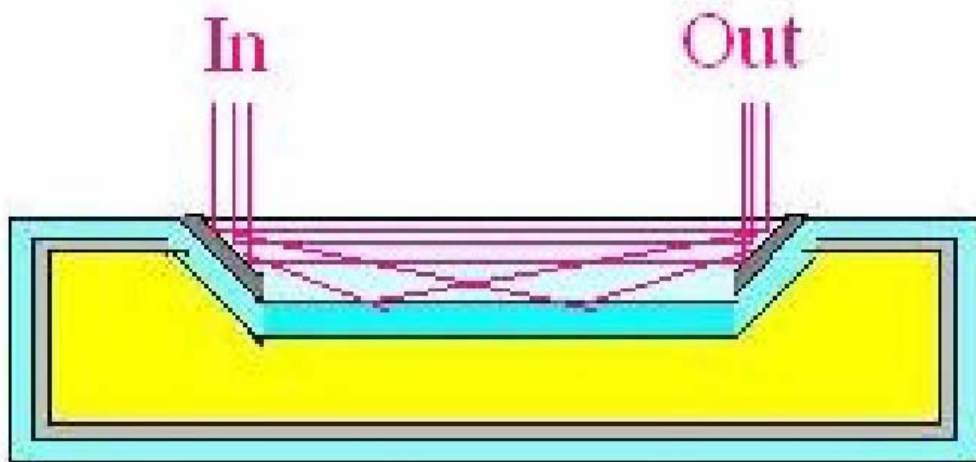
- Process Architecture
- Mask Design
- Photolithography
- Silicon Oxidation
- Wet Etching
- Thin Film Deposition (evaporation)
- Photoresist and Photoepoxy (SU-8) processing
- Packaging
- Testing

Lab Work

1. Microflow Cytometer for Cell Sorting



2. Micromachined Optical Waveguides



Microfabrication Laboratory and Her Friends

