

Selectively Addressed MEMS Deformable-Mirror Arrays for Adaptive Optics

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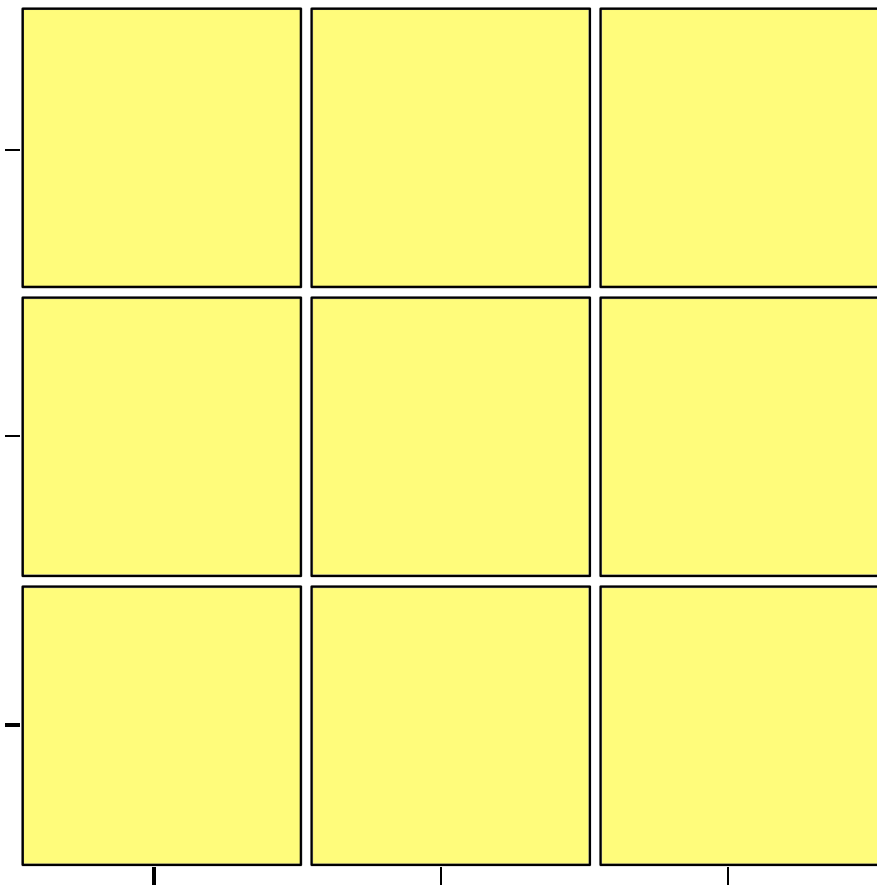
CfAO Fall Retreat

Nov. 13, 2004

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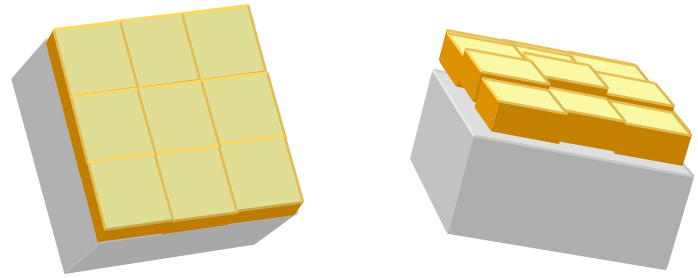


MEMS Deformable-Mirror Arrays



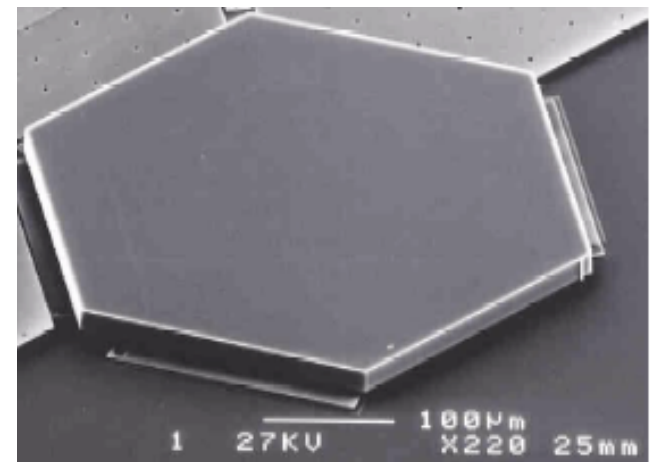
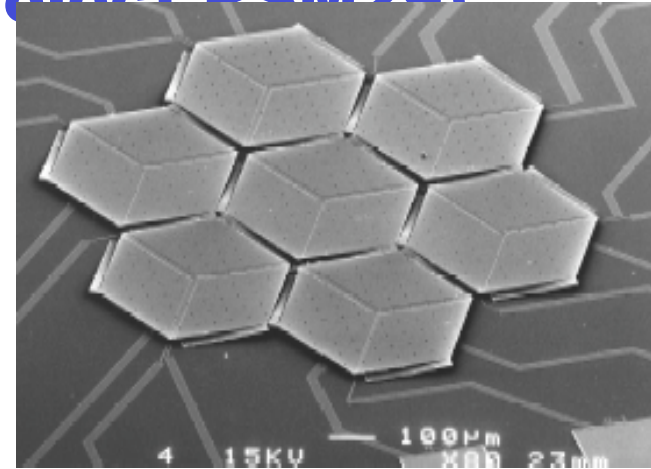
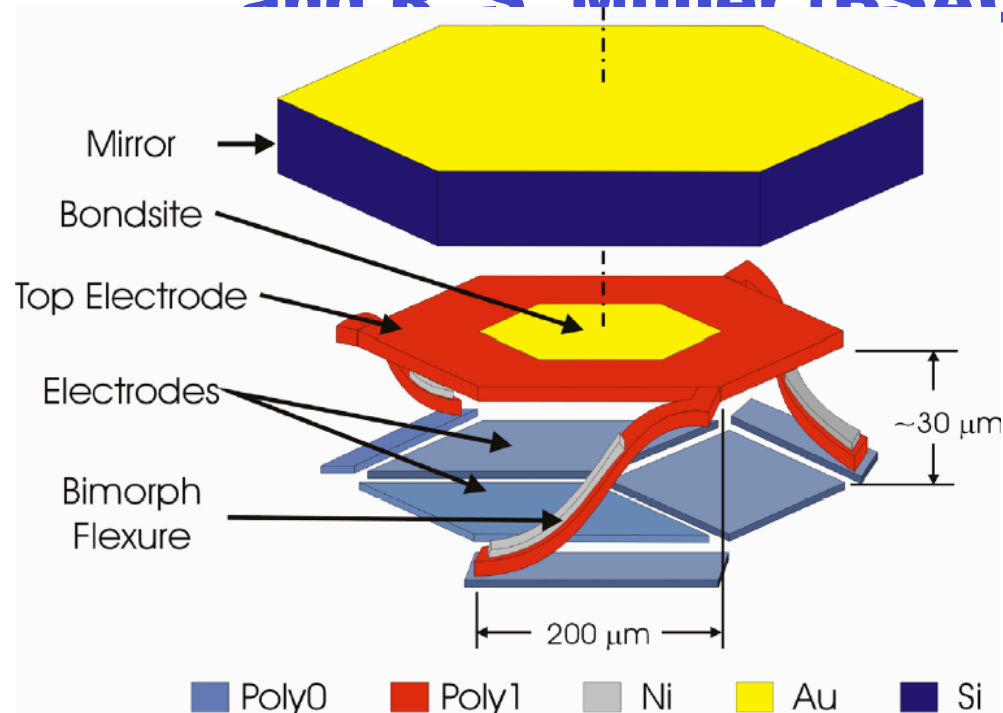
Specifications:

- Large deflection
 - Fill factor $\geq 98\%$
 - Digitally addressed
 - 100s to 1000s of mirror segments
 - CMOS compatible
 - Requires analog actuation voltage
- Must integrate microelectronic & micromechanical fabrication!**



Previous Work

by M. A. Helmbrecht, U. Srinivasan, R. T. Howe,
and R. S. Muller (BSAC Project BSM20)



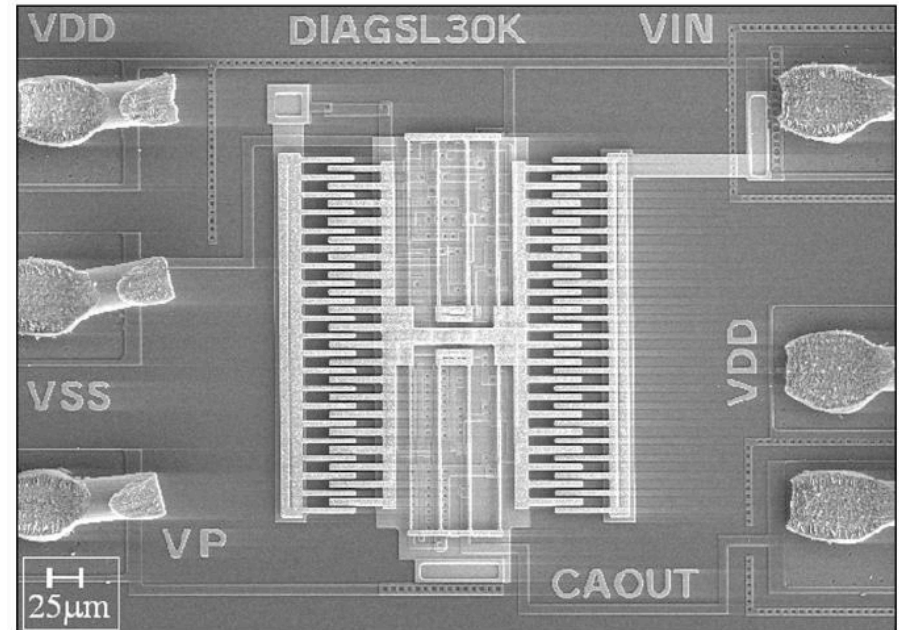
- **Bimorph flexure to obtain large original gap ($\sim 30 \mu\text{m}$)**
- **Mirrors self-assembled onto platforms**

Photos: Courtesy of M. A. Helmbrecht

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Poly-SiGe MEMS Technology

- **CMOS-compatible deposition temperature**
- **Mechanical properties similar to poly-Si**
- **Low resistivity using in-situ p-type doping**
- **Low contact resistance to aluminum interconnect**



A. E. Franke et al., Solid-State Sensor and Actuator Workshop, Hilton Head 2000

Next Six Months

- Complete the fabrication of poly-SiGe actuators
- Characterize the poly-SiGe actuators
- Design control electronics for actuator arrays

Acknowledgement

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