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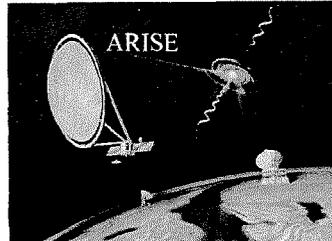
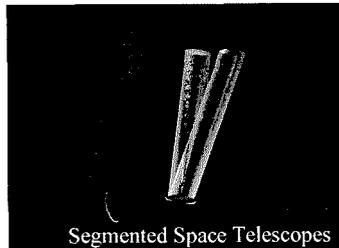
Deformable Mirror Applications

Astronomical Imaging

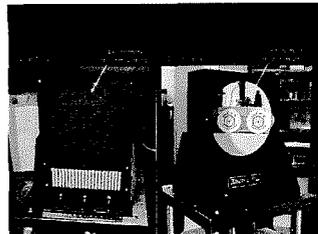
- Precision wavefront control for Large, Lightweight, Space Telescopes

→ Apertures segmented or inflatable

- Large stroke deformable mirrors are required.



Conventional Deformable Mirrors

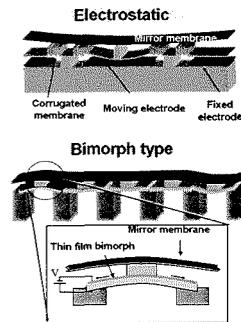


Piezo ceramic or electrostatic deformable mirrors

Drawbacks:

- Temperature limitation
- Stroke/size limitation

Optical Quality MEMS Deformable Mirror



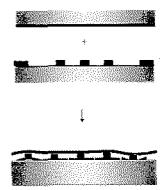
Transferred mirror membranes for optical quality deformable mirrors

- Electrostatic actuation for precision operation

- Bimorph actuation for large stroke actuation

- Large stroke actuators are essential for high order wavefront compensation for segmented telescopes and inflatable reflectors.

Wafer Transfer Process

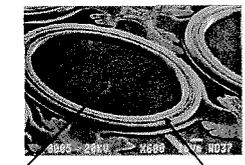
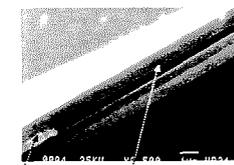


- Transfer of a mirror membrane from one wafer to another for optical quality mirror

- Surface quality: Transferred membrane is replica of the carrier wafer.

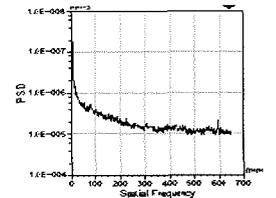
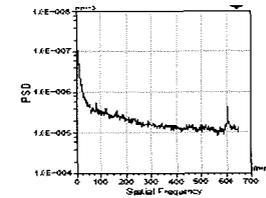
- Several optical materials can be transferred.

Transferred Mirror Membranes

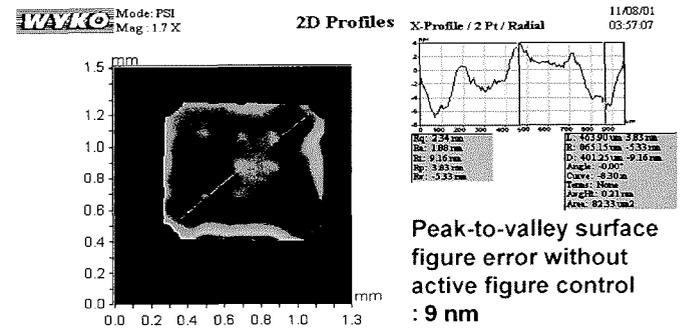


Transferred polysilicon membrane

X Average PSD Plots of Silicon Surfaces



Surface Profile of a 16 μm thick Transferred SCS Membrane



Hermetic bonding

