

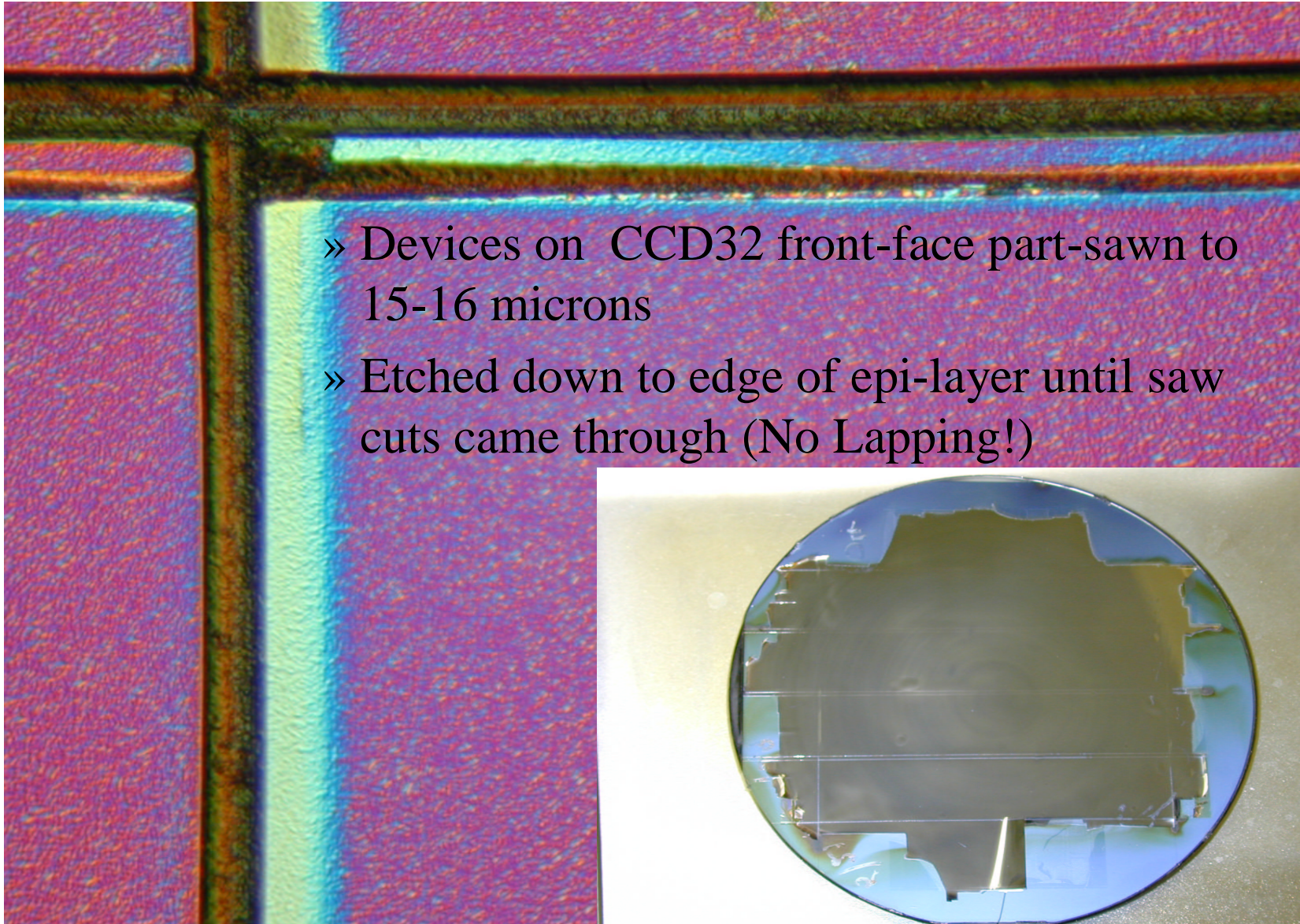
# Results of CCD Thinning Experiment at MTech

*Glenn Christian,  
Andy Harris, Peter Pool (MTech)*

Aim: To characterise distortions of thinned CCDs and investigate  
technique of part-sawing before stop-etching

# Procedure

- » Devices on CCD32 front-face part-sawn to 15-16 microns
- » Etched down to edge of epi-layer until saw cuts came through (No Lapping!)

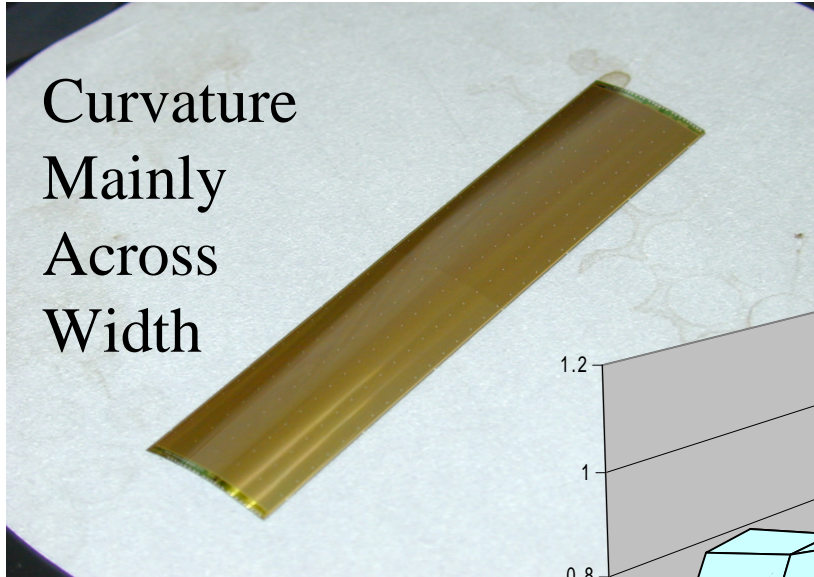


## Procedure (continued)

- 3 devices removed from substrate wafer unsupported; 1 supported with thick silicon end blocks and bridge
- Devices removed by melting wax between active and substrate wafers and sliding off
- Residual wax removed in trike bath

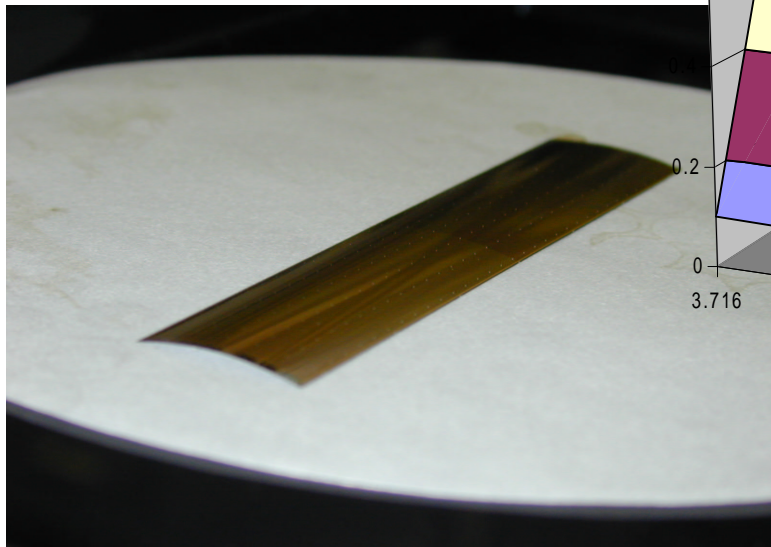
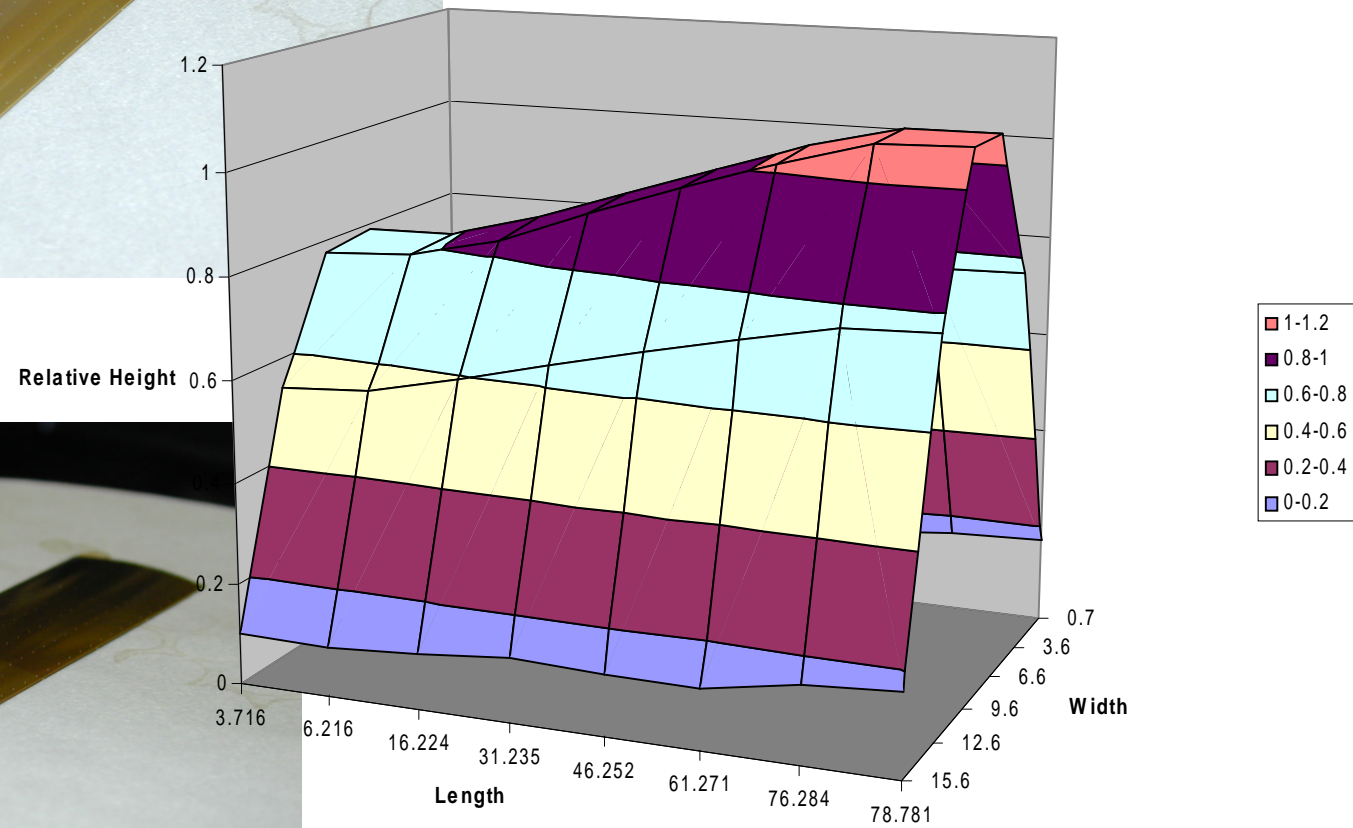


Curvature  
Mainly  
Across  
Width

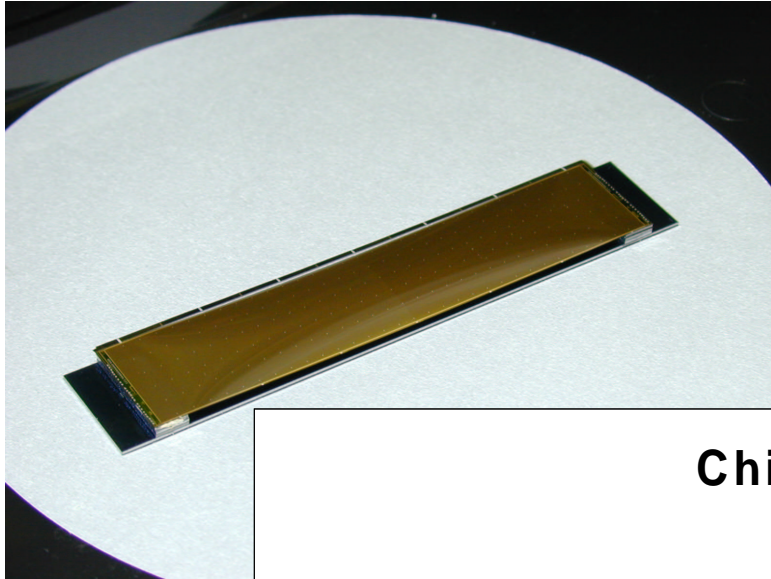


Second chip off wafer  
-Completely freestanding

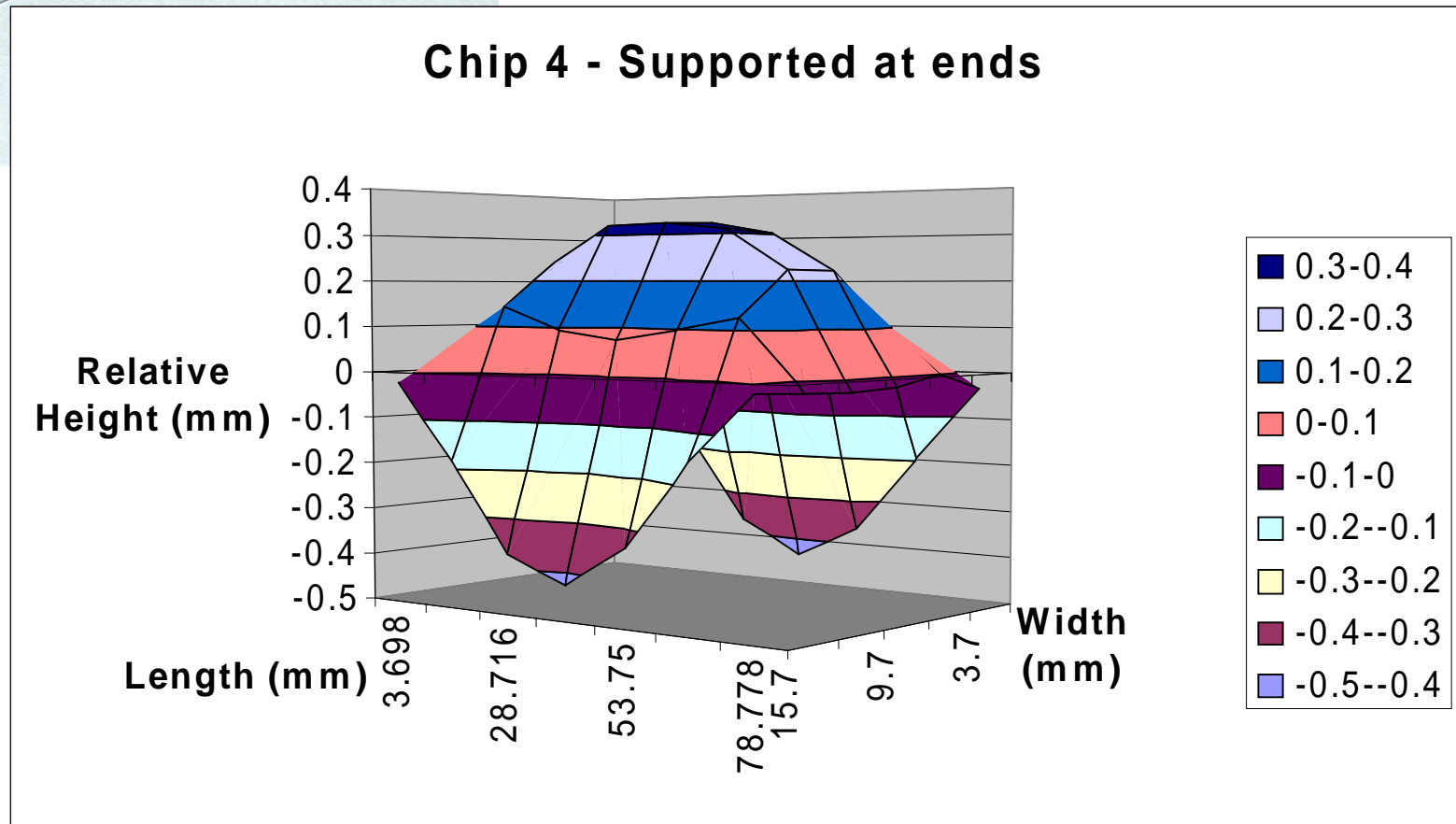
Chip 2 - Freestanding



Note: Non-linear scale along length



Fourth chip off wafer  
-Supported at ends  
c.f. 'unsupported  
silicon option'



## Results

- Final epitaxial thickness – 12-13 microns
  - Etched further into epitaxial layer than planned
- All 4 devices showed bow along width as opposed to length
  - caused by stresses induced from polysilicon electrodes with run across width, probably preventing any longitudinal curl.
- DC probe tests on devices: Passed!
  - Original reason for wafer rejection unknown

## Conclusions and Next Steps

- Curvature across device will be amplified by metal buttressing and temperature cycling; although will be reduced by having thicker devices
  - Make new samples of 20-25 micron thick devices – expect less bow across width
- Might be possible to mechanically balance CCD using the right combination of lapping and etching- lapping induces stresses into the epitaxial silicon.
  - Need to study stresses and deformations caused by polysilicon layer and lapping, with a variety of tests on samples