

UVDI Technology Overview



**SILICON
LIGHT
MACHINES**

A **SCREEN** COMPANY

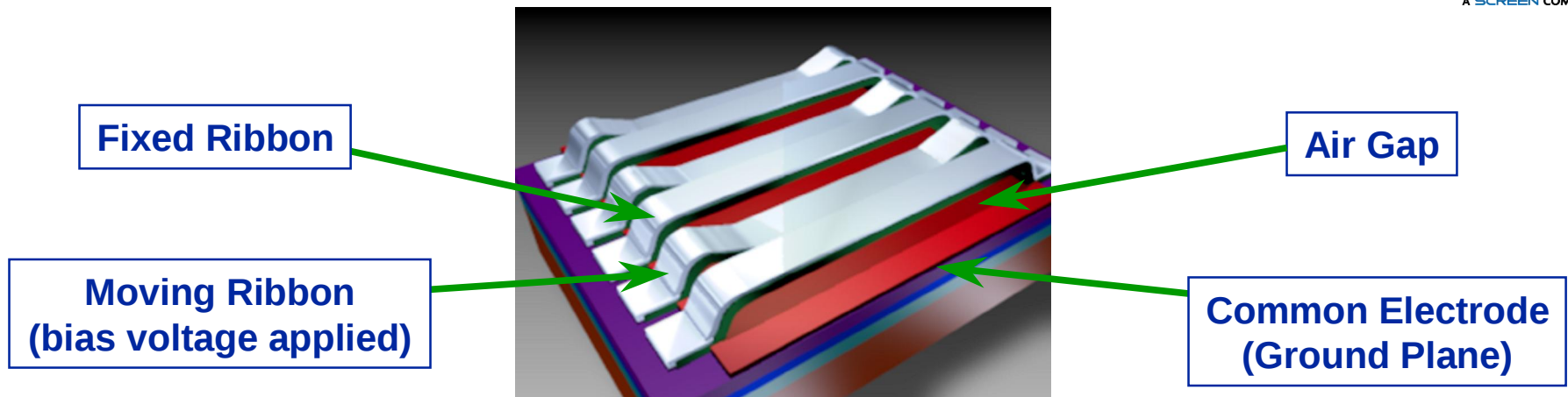
Ultra Violet Direct Imaging

Based on

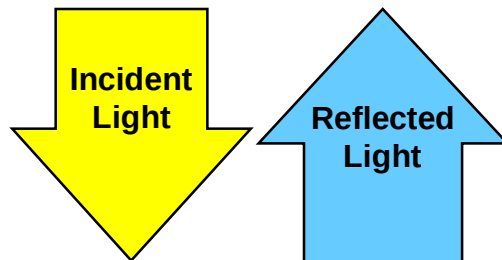
Integrated GLV Technology

Grating Light Valve™ Technology

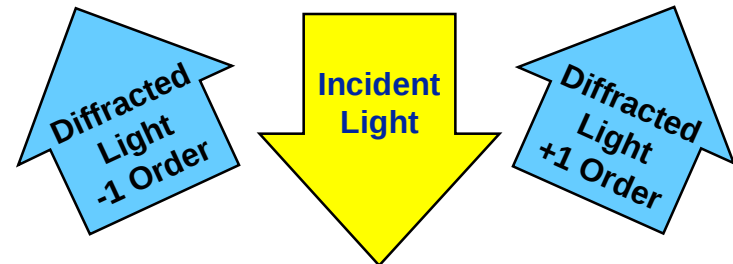
Spatial Light Modulation Based on Diffraction



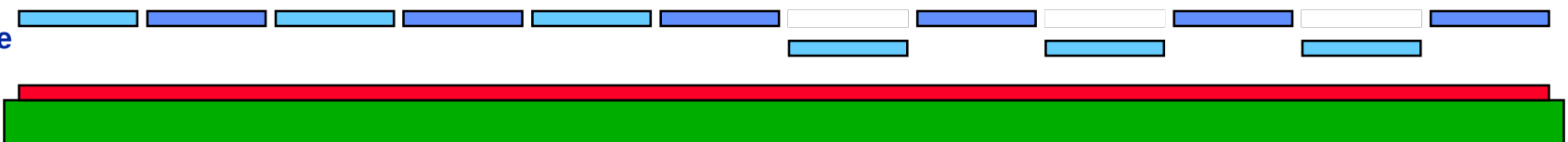
Specular State ñ No Bias



Diffraction State ñ Bias Applied



GLV Device
Cross
Section

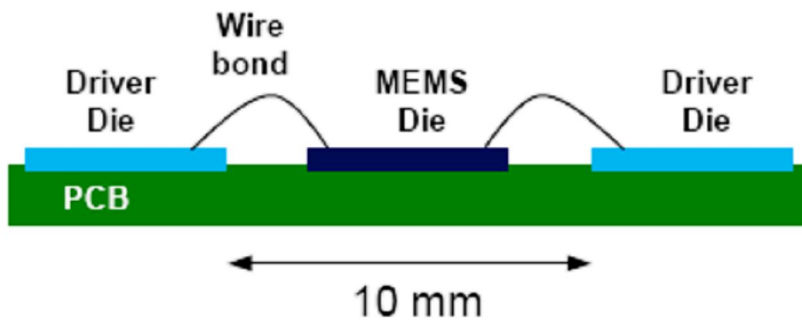


Integrated MEMS ñ What is it?

- **Integration = CMOS + MEMS on the same chip**
- **MEMS devices must interfaced to outside world. These interfaces can fall into 2 general categories:**
 - Multi-chip packaging solutions (multiple chips wire-bonded)
 - Monolithic integration solutions (single chip)
- **Motivation for integration:**
 - Performance (high density, low parasitics, e.g. iGLV)
 - Cost (reduced component count)
- **SLM is one of the few companies to successfully realize a fully integrated MEMS/CMOS device (iGLV)**
 - 2006: SLM integrated GLV with Cypress Via-link 2.7 process
 - 2009: SLM is integrating GLV with Freescale SmartMOS07

Discrete & Integrated Solutions

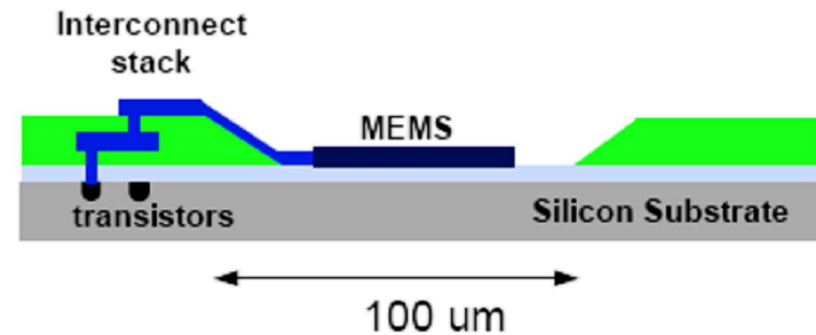
Multi-chip Module



- **Worked well for CtP application**

- 1088 channels
- 28 mm die length
- 25.5 μm channel pitch

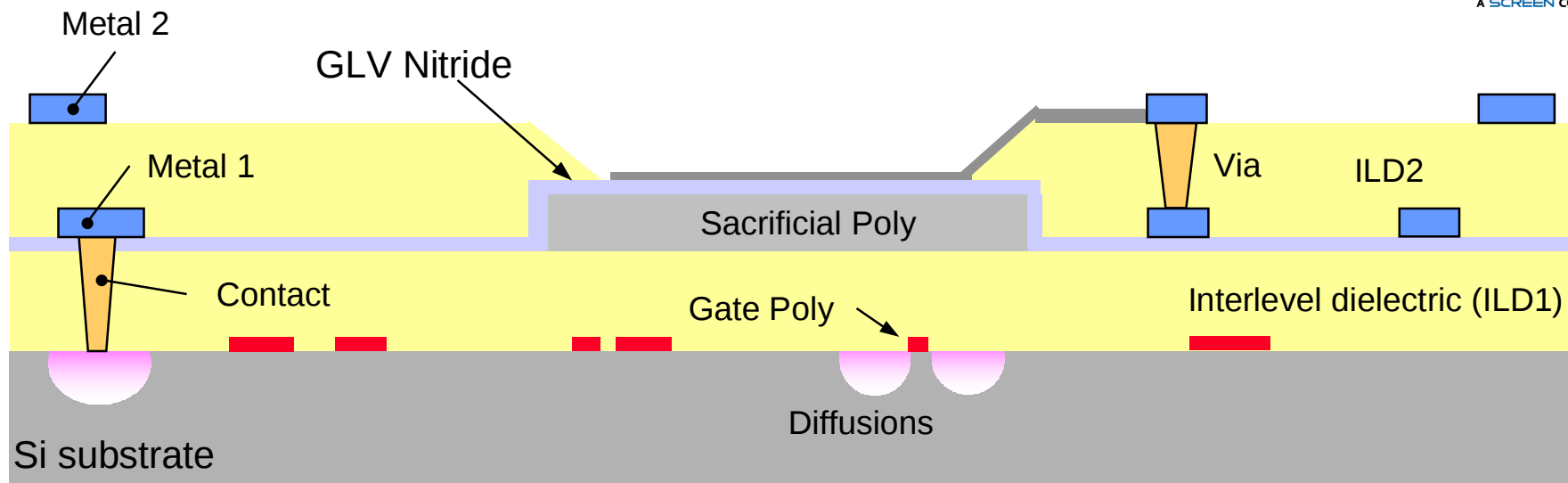
Monolithic Integration



- **Required because of UVDI channel count**

- 8192 channels
- 41 mm die length
- 5 μm channel pitch

Integrated Process Flow

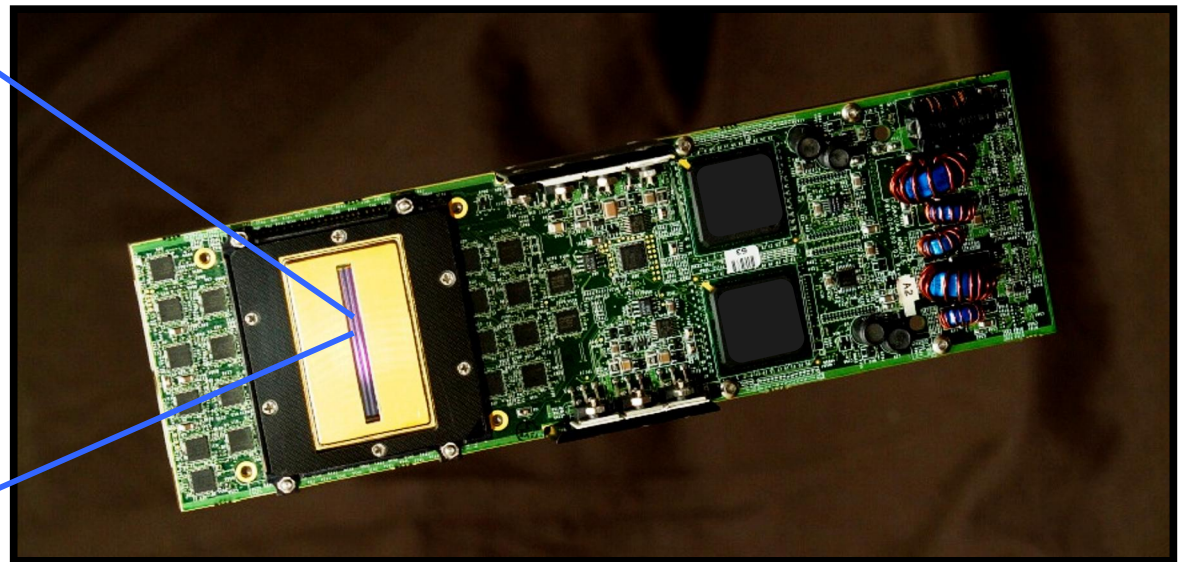
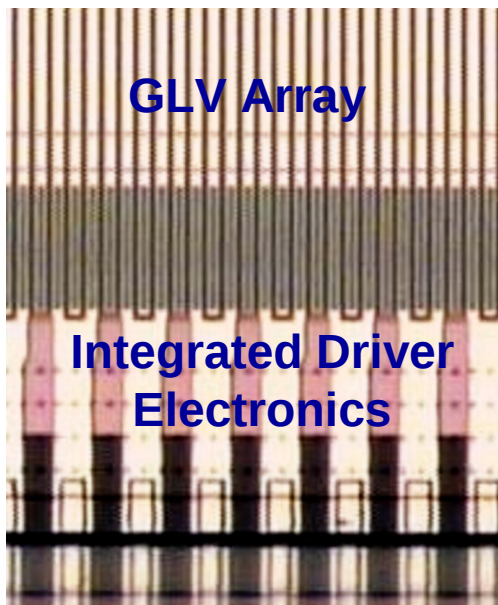


- Transistor diffusions are first.
- Poly-Si gate lines followed by first insulating oxide & polish (CMP)
- Contacts are drilled & filled. Surface is polished again.
- GLV sacrificial layer is deposited & patterned
- LPCVD silicon nitride ribbon deposition.
- Metal1 deposited & patterned, more dielectric, vias, and Metal2.
- GLV re-exposed with high-selectivity etching & final interconnect
- Final MEMS ribbon patterning. GLV complete

New 8K Integrated GLV Device



- GLV linear array has 8192 addressable elements
- 12-14 bit Grayscale (independent of frame rate)
- Designed for UV applications



Direct Write Lithography Applications



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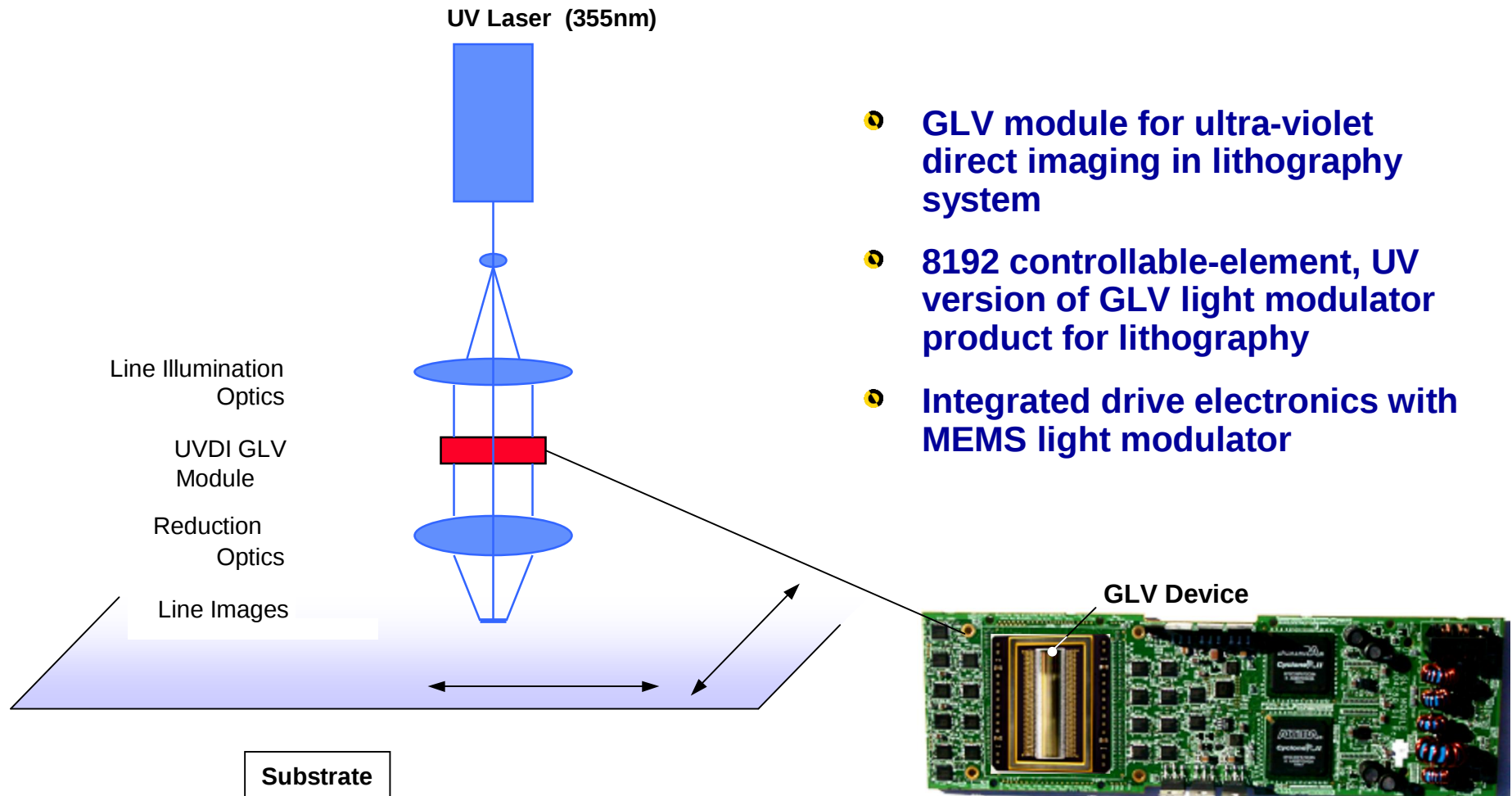
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GLV™ Direct Write Lithography

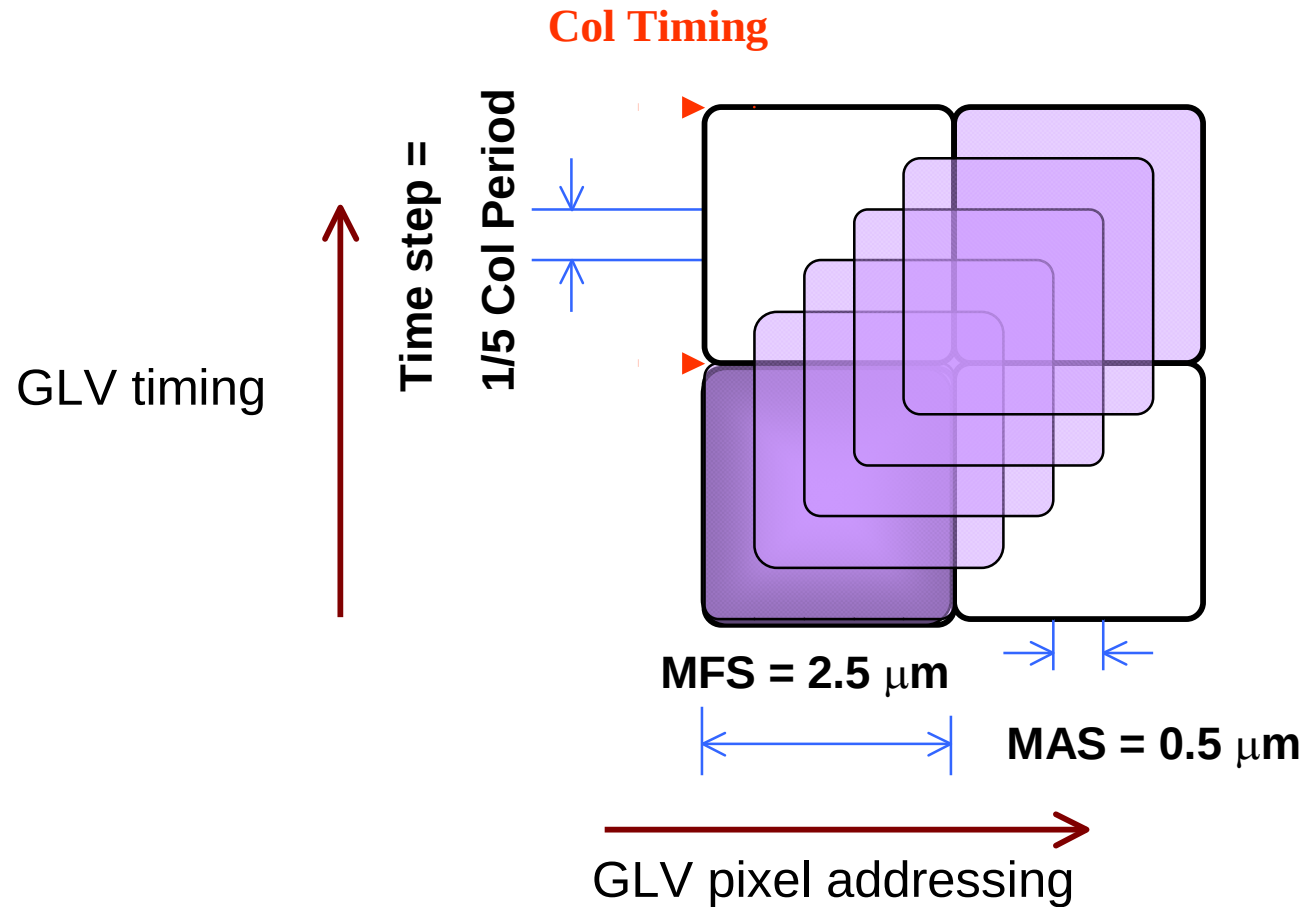


- **Developed new, high pixel count Ultra Violet Digital Imaging (UVDI) GLV module**
- **Customer system currently in Beta trials in production fab**
- **UVDI Module can be modified for visible (RGB) applications**

Maskless Lithography using GLV



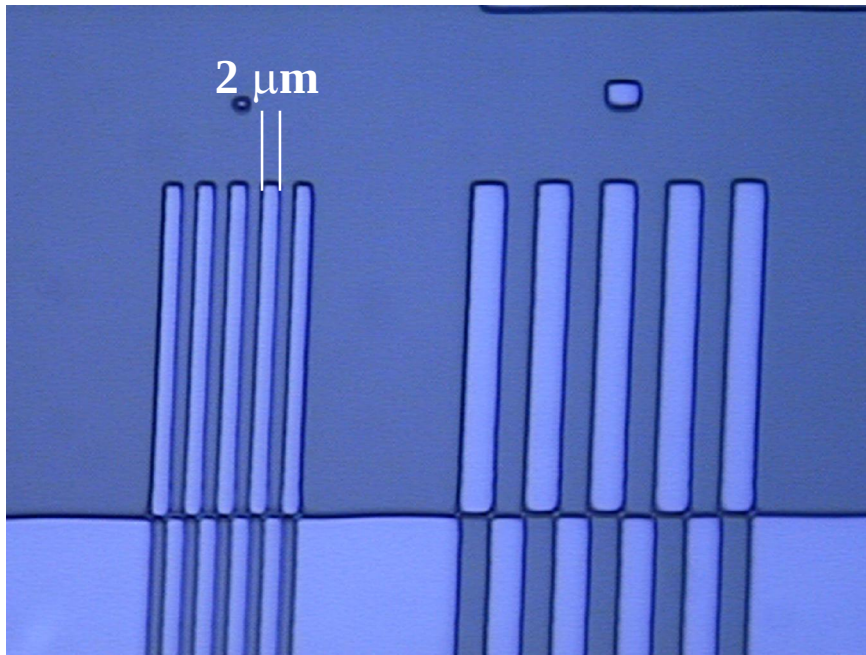
Micro-address Technology



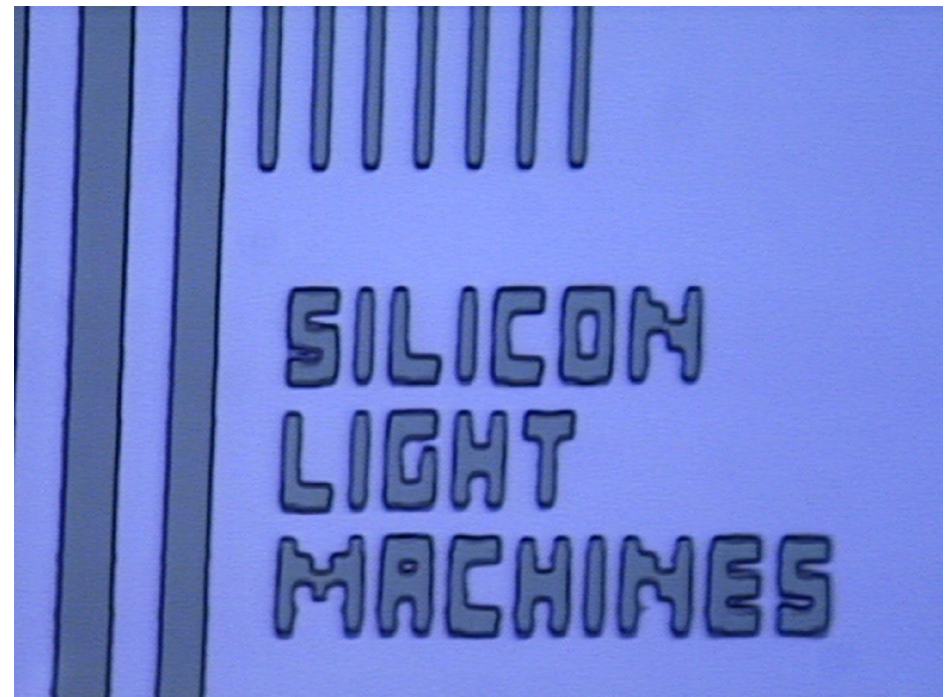
MFS: Minimum Feature Size

MAS: Minimum Address Size

GLV Maskless Lithography



- 355nm exposure
- I-line resist
- 2 micron resolution



Wafer Direct Imaging



- 300 mm wafer
- 2.5 μm resolution

Provided by courtesy of
Dainippon Screen R&D Center



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Thank you!!