

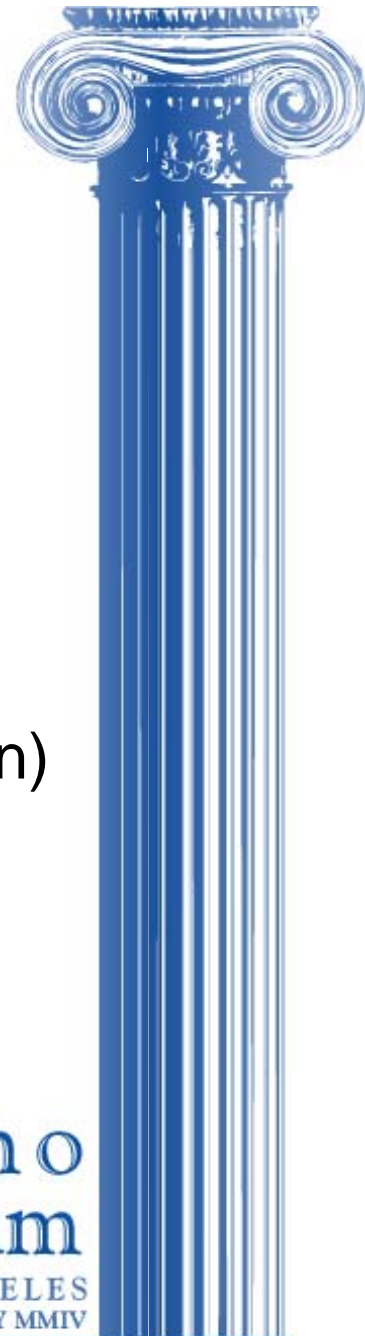
# Optical Maskless Lithography

## Agenda

Introduction:	Bill Oldham (5 min)
Technology Status:	Kevin Cummings (60 min)
Q&A:	Scott Hector (12 min)

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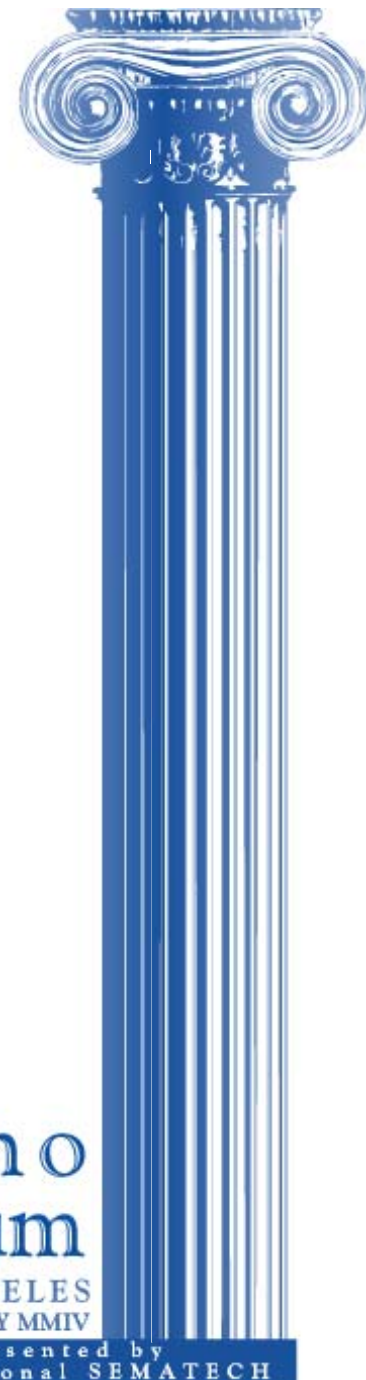
# Poster Papers !

Please visit the following poster papers on Maskless Lithography

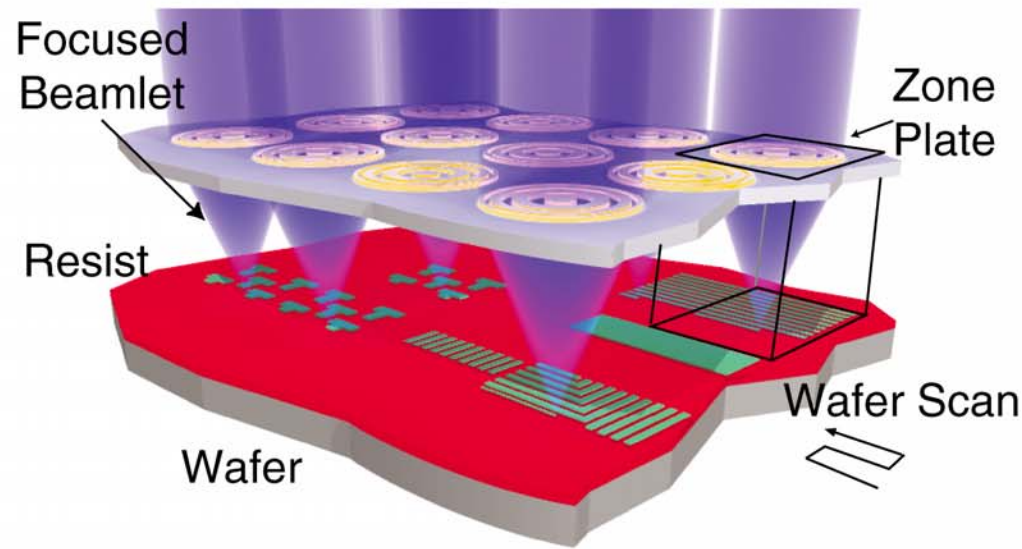
- Hank Smith *et. al.* Lumarray/MIT  
“Maskless Zone-Plate-Array Lithography”
- Charlie Roxlo *et. al.* Silicon Light Machines “Grating Light Valves for Optical Microlithography”

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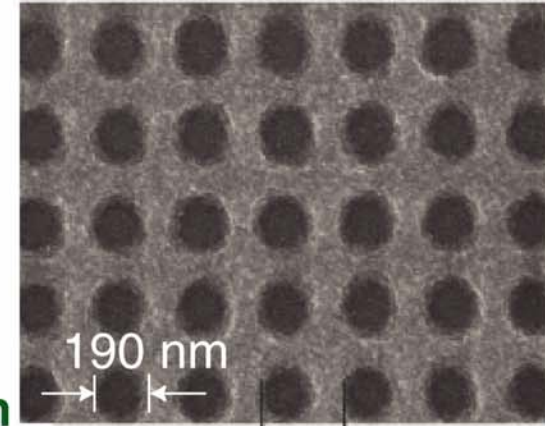
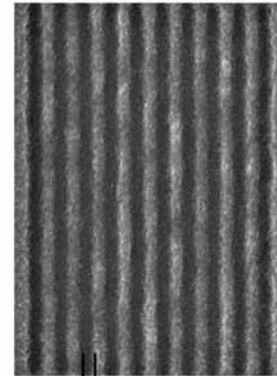
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# Maskless, Zone-Plate-Array Lithography

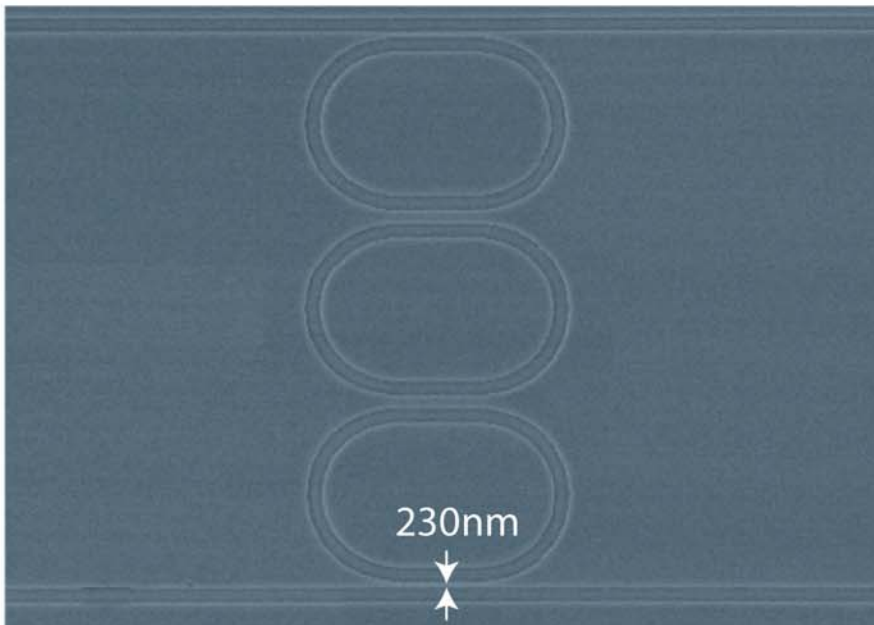


$$k_1 = 0.32$$



$$\lambda = 400\text{nm}$$

## Optical Communications Filter

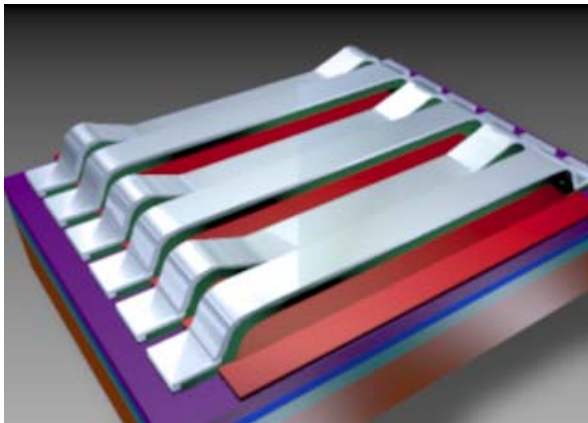


- Low-cost, simple
- 45nm node @  $\lambda = 198\text{nm}$
- Extendible to EUV
- Moderate-High Thruputs
- MIT Prototype → Device Fab

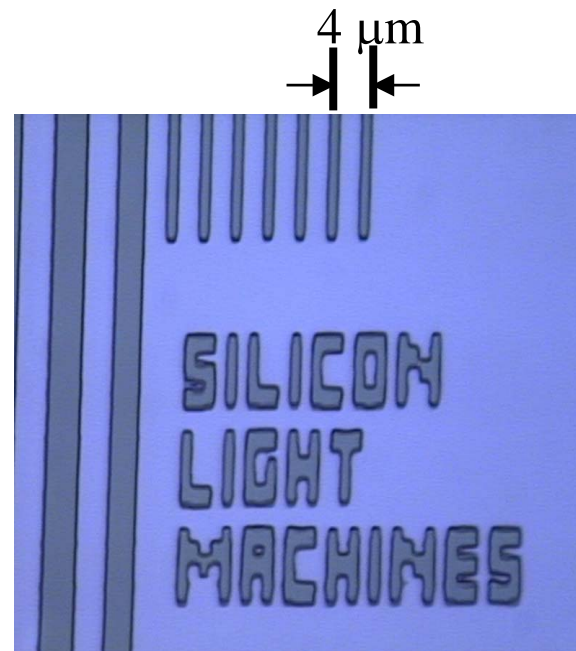
# Grating Light Valve™ Technology

## Spatial Light Modulation Based on Diffraction

- Highest-speed MEMS – GLV device can provide MHz range modulation
- Robust and Effective Gray scaling – up to 10 bit accuracy
- Smallest MEMS Pixels
- Proven Reliability – currently used for maskless lithography in commercial platesetters



GLV Pixel



2µm features written into resist at 355nm

# Introduction to and Status of Maskless Optical Lithography

Kevin Cummings<sup>1</sup>, Arno Bleeker<sup>1</sup>, Jorge Freyer<sup>2</sup>, Jason Hintersteiner<sup>1</sup>, Karel van der Mast<sup>1</sup>, Tor Sandstrom<sup>2</sup> and Kars Troost<sup>1</sup>

1



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