EE669: VLSI Technology

Lithography

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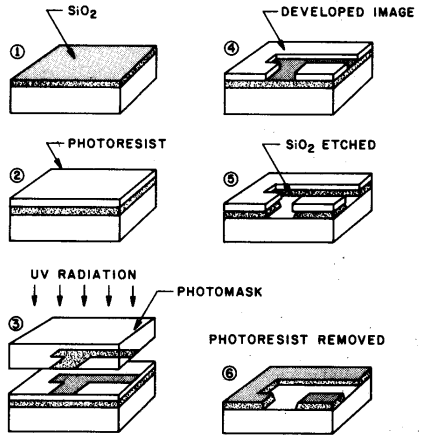
Basic Photolithography Process (1)



VLSI Technology, Edited by S. M. Sze, 1983

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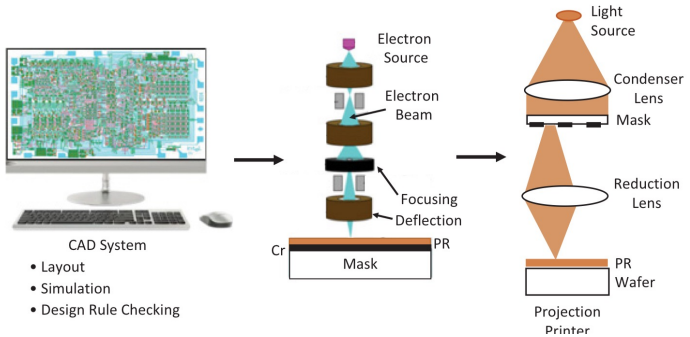
Basic Photolithography Process (2)



Plummer and Griffin, Integrated Circuit Fabrication: Science and Technology, 2023

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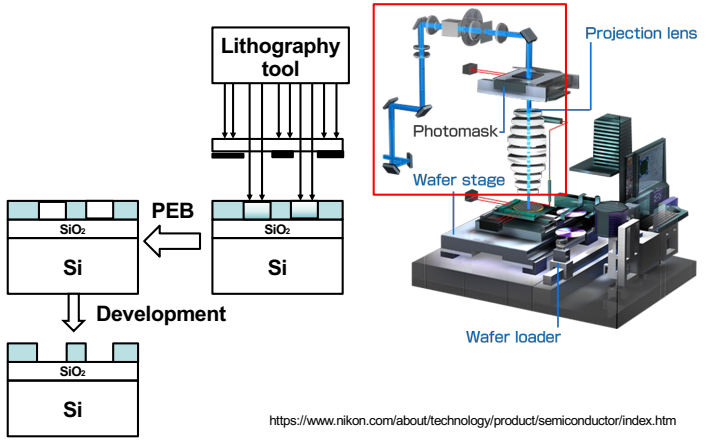
Basic Photolithography Process (3)



https://www.nikon.com/about/technology/product/semiconductor/index.htm

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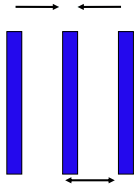
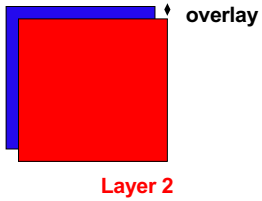
Critical dimension and overaly

Critical dimension (CD)
The smallest that can be printed.



Pitch = CD + Spacing between lines



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Important specifications

- Critical dimension: the smallest feature that can be printed
- Pitch: relates to the smallest spacing between the features
- Overlay: the alignment accuracy of a layer to the previous layer
- Throughput: wafers that can be processed per hour
- Defect density: Defects generated on the wafer per unit area by the lithographic process

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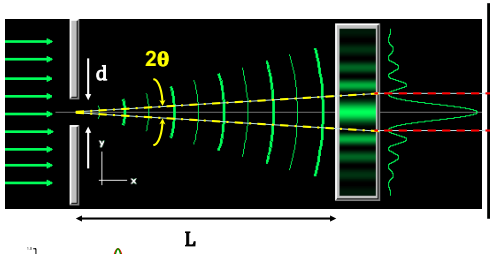
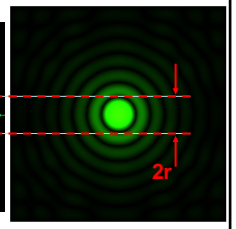
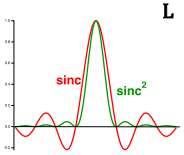
Basics of lithography optics: diffraction





Airy disc pattern



$$\theta = 1.22\frac{\lambda}{d}$$

$$r = 1.22L\frac{\lambda}{d}$$

For derivation, see http://electron9.phys.utk.edu/optics421/modules/m5/Diffraction.htm

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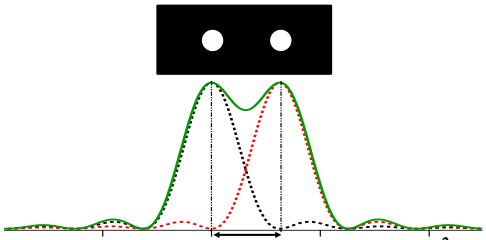
Basics of lithography optics (2): resolution



Resolution, $r = 1.22L\frac{\lambda}{d}$

For derivation, see http://electron9.phys.utk.edu/optics421/modules/m5/Diffraction.htm

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