Micro/Nanosystems Technology

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Lab Course UV-Lithography

Proximity Printing

\[ R = b_{\text{min}} = \frac{3}{2} \sqrt{\lambda \left(s + \frac{z}{2}\right)} \]

\[ R = b_{\text{min}} = \frac{3}{2} \sqrt{0.44 \left(8 + \frac{2}{2}\right)} = 2.98 \approx 3 \mu m \]

Siemens star

- Resolution of printing device can be measured by the diameter \( d \) of the blurred region:

\[ R = \frac{2\pi r}{\# \text{segments}} = \frac{\pi d}{\# \text{segments}} \]
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Negative resist (Group 4)

Siemens star:

\[ R = \frac{66.7 \pi}{72} = 2.9 \approx 3 \, \mu\text{m} \]

dark: photo resist
light: wafer

Siemenstar without chromium coating at 50x
Negative resist

3µm line and spacing at 50x

- $b_{\text{min}} = 3$ micrometer
- Decreasing the dimension, low pattern fidelity

- Under 3 micrometer (the resolution limit), non-distinguishable line and spaces
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Negative resist

Line and spacing at 5x magnification

- not resolved for \( b = \) below 3 micrometer, except 1.5 micrometer
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Negative resist / after Lift-Off

3μm line and spacing after chromium coated at 50x

lines and spaces:
• $b_{\text{min}} = 3.19$ micrometer

Decreasing the dimension, worse pattern fidelity than before Cr coating

Line and spacing after chromium coating at 5x

dark: Photo resist
medium: Wafer
light: Chromium
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Negative resist / after Lift-Off

1µm line and spacing after chromium coated at 50x
Negative resist / after Lift-Off

Siemens star:
diameter of distortion
d=73.3 micrometer
R=3.19 micrometer

→ The resolution decrease after lift-off