Preliminary test for a positive e-beam resist AR-P 6200.09 (CSAR 62)

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Test sample:

20 mm x 20 mm Si chip (1-0-0)

Spin:

7000 rpm 45 sec - - - > 180 nm

Bake:

180°C/180 sec on a hot plate

Expose (Raith 150):

Acceleration Voltage: 25 keV
Aperture: 20 µm
Current: 0.128 nA
Step size: 26 nm

Doses 10:5:185 µC/cm^2 + 47.5:5:122.5 µC/cm^2
Pattern: Rectangle 60 µm x 20 µm

Develop (@ room temperature)**:**

Amyl Acetate: 60 sec (immersed) - - - Recommended developer by Allresist

Rinse IPA: 15 sec

Rinse Pentane: 10 sec

N_2 blow

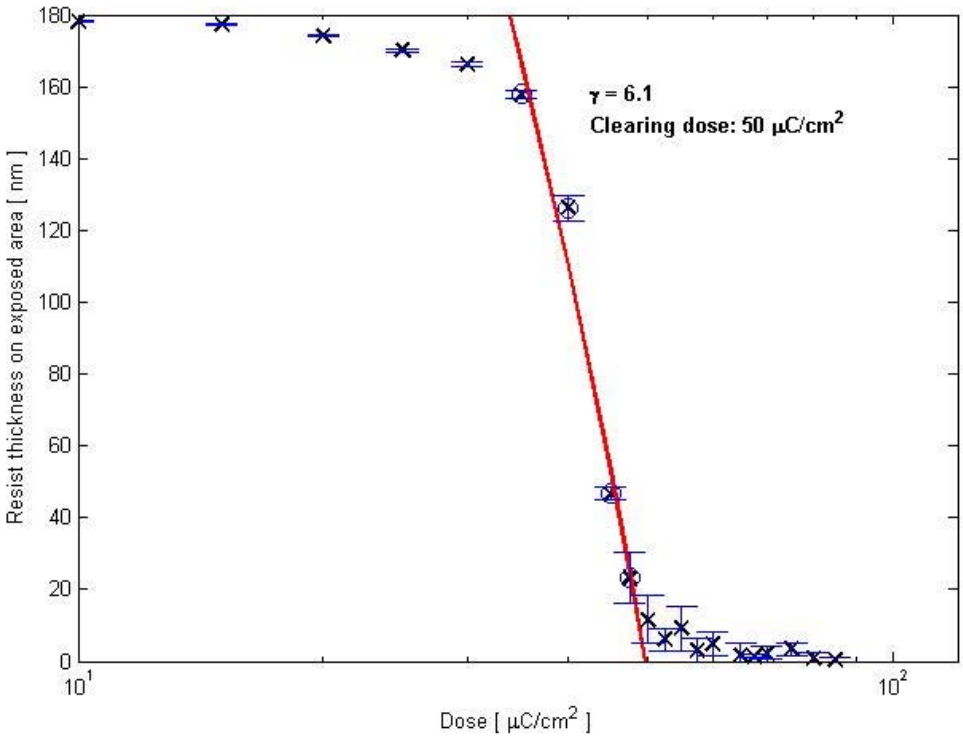
Characterization:

Icon AFM
20 scans over exposed line

Contrast curve fitting with data points between 10 – 90 % of total resist thickness

$$\gamma = \frac{1}{\log_{10} D_1 - \log_{10} D_0}$$

Contrast	Dose-to-clear (D_1)
$\gamma = 6.1$	50 $\mu C/cm^2$



Line quality:

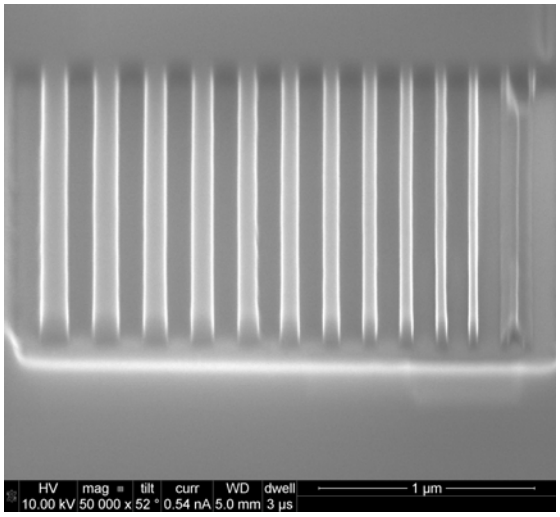
100 nm and 50 nm lines are exposed on samples (prepared as described above). The designed line width was kept constant but line-to-space ratio was decreased over the test area. The images below show the resist profile imaged at the tilt angle of 52°.

Exposure parameters (Raith 150):

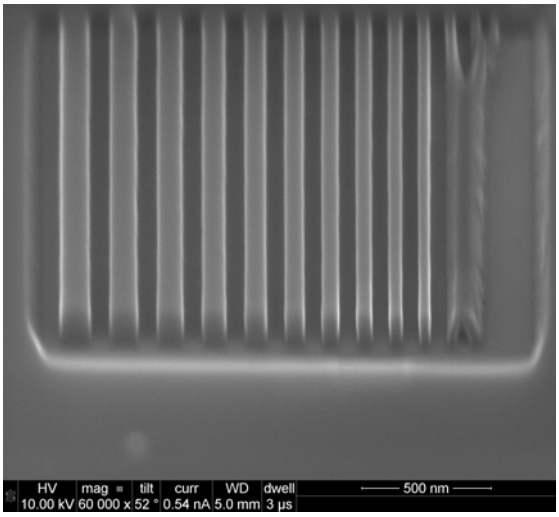
- Acceleration Voltage: 25 keV
- Aperture: 10 μm
- Current: 27 pA
- Step size: 4 nm

Patterns:

- 100 nm - - - > Area 2.6 μm x 2.1 μm
- 50 nm - - - > Area 2.0 μm x 2.1 μm



100 nm lines are exposed with a gradually changing line-to-space ratio. 65 μC/cm^2 *dose fully clears the lines. Note that exact line widths are not optimized here.*



50 nm lines are exposed with a gradually changing line-to-space ratio. 80 μC/cm^2 *dose fully clears the lines. Note that exact line widths are not optimized here.*

Additional Information:

Allresist Data Sheet