



AZ 5200-E Photoresist

Data Package



AZ 5200-E Photoresist

Original **i-line** resists

Various viscosity grades
for a multitude of applications.

Sensitive in **i-line** and **g-line**

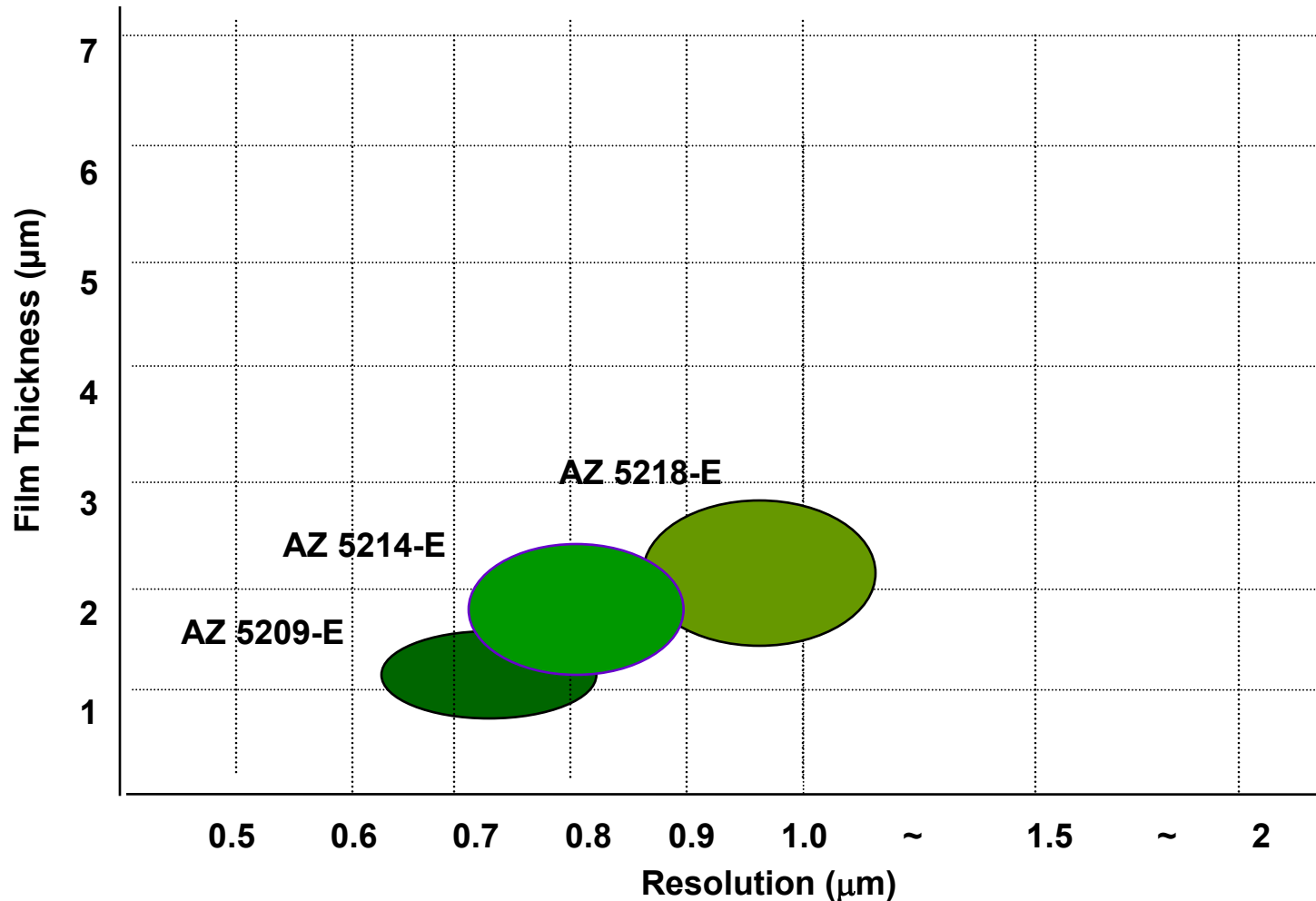
Can be developed
in a variety of metal ion free
and inorganic developers
(with and without surfactants)

High thermal stability.

Can be used in a positive mode
and with a special
image reversal process.

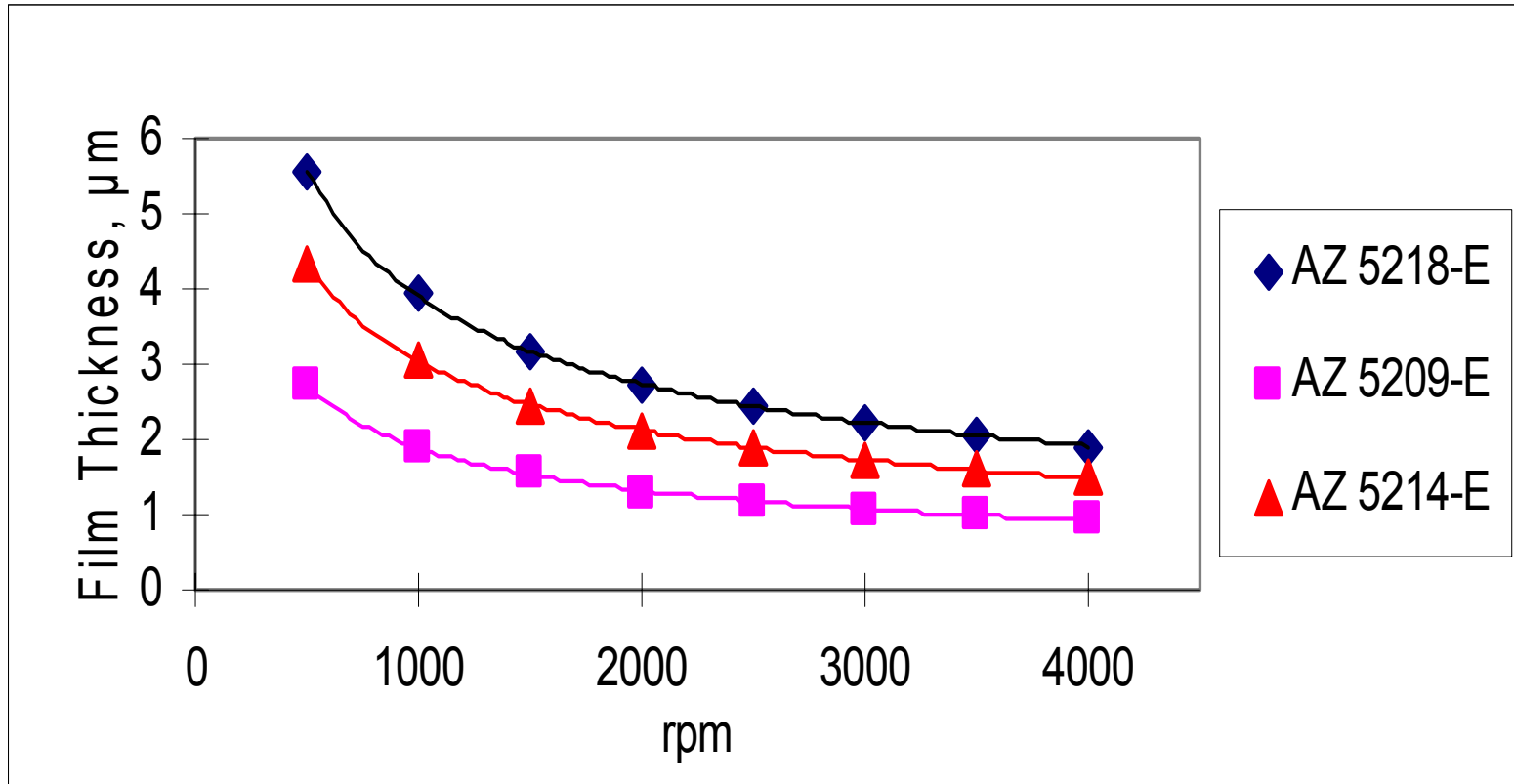
AZ 5200-E Photoresist

i-line Resolution at Specific Film Thickness



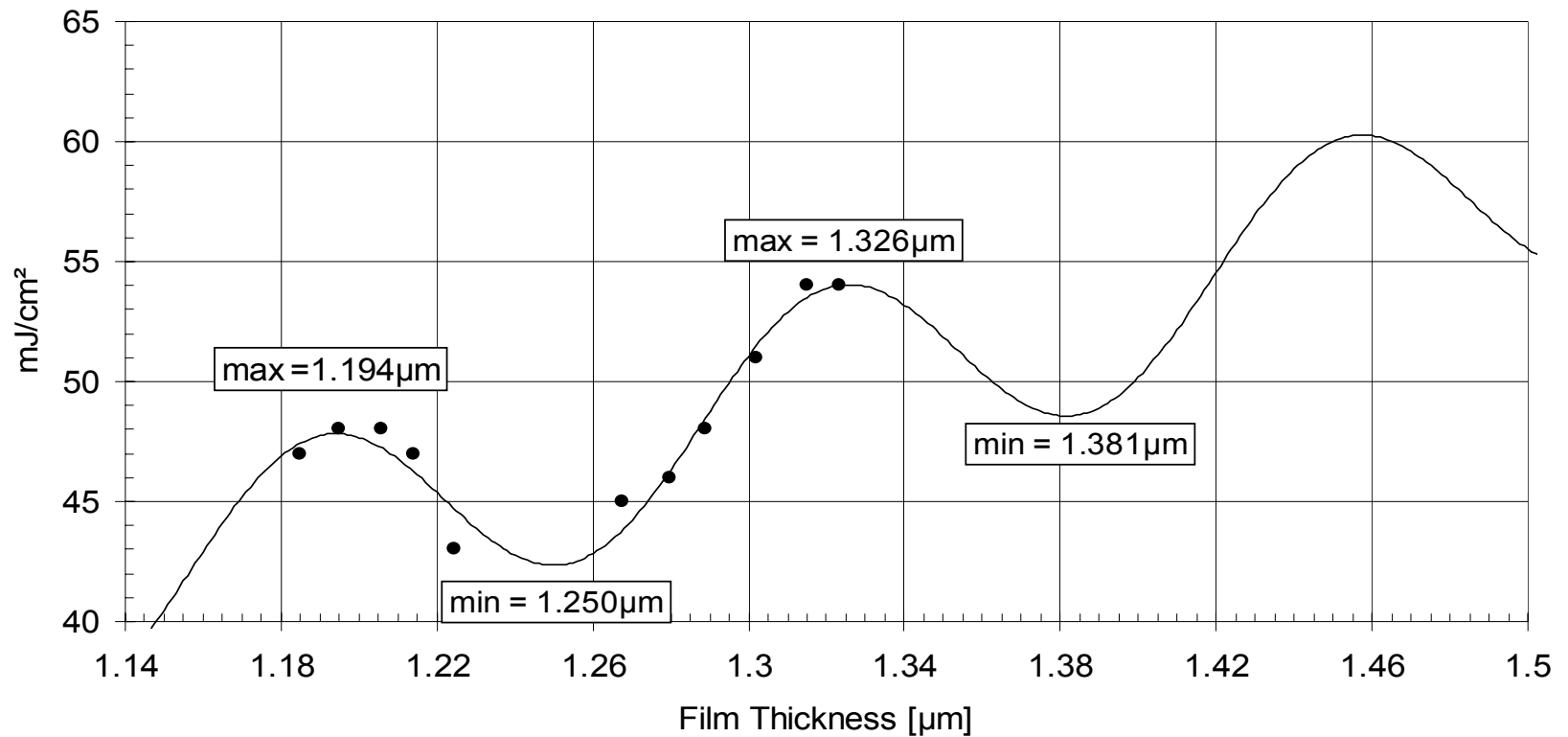
AZ 5200-E Photoresist

Spin Speed Curves



AZ 5200-E Photoresist

DTC Swingcurve for AZ 5214-E Resist
AZ 1:1 Developer



AZ 5200-E Photoresist

Optical Parameters

◇ Refractive Index

<u>Bleached</u>	<u>365nm</u>	<u>405nm</u>	<u>435nm</u>
n	1.6904	1.6667	1.6534
k	0.0012	0.0005	0.0004
 <u>Unbleached</u>			
n	1.6990	1.6888	1.6758
k	0.0175	0.0179	0.0040

AZ 5200-E Photoresist

Optical Parameters

◇ Dill Parameters

i-line:

$$A = 0.6181 \text{ (}\mu\text{m}^{-1}\text{)}$$

$$B = 0.0314 \text{ (}\mu\text{m}^{-1}\text{)}$$

$$C = 0.0284 \text{ (cm}^2\text{/mJ)}$$

g-line:

$$A = \text{NA}$$

$$B = \text{NA}$$

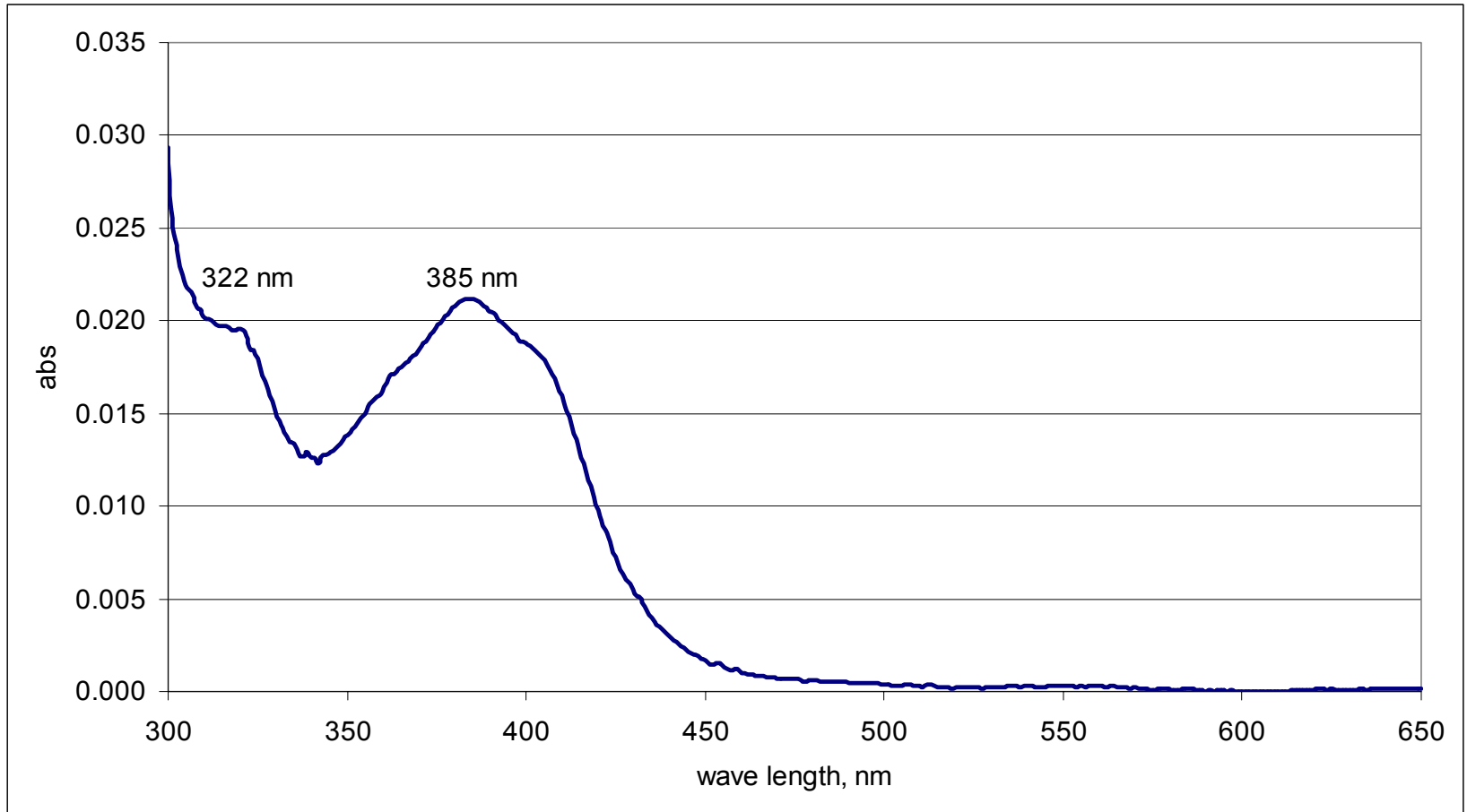
$$C = \text{NA}$$

◇ Cauchy Coefficients

	<u>A</u>	<u>B</u>	<u>C</u>
Bleached	1.5908	$0.011525\mu\text{m}^2$	$6.70\text{E-}07\mu\text{m}^4$
Unbleached	1.6035	$0.005574\mu\text{m}^2$	$2.34\text{E-}03\mu\text{m}^4$

AZ 5200-E Photoresist

Optical Parameters - Absorptivity



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AZ 5200-E Photoresist

Image Reversal Process

1. Prepare wafers (e.g. HMDS prime)

Improved Adhesion

2. Spin coat 0.6-2.6 μ m

3. Soft bake 90-100°C/ 45-60sec hot plate

Oven bake 90°C/ 30min

4. Expose (**g-line**, **i-line**, broad band)

Under-exposure gives
lift off profile

5. PEB 110-120°C/ 45 sec or two step

Inducing cross linking

6. Flood exposure (365-405nm/ 1-2J/cm²)

Solubilization of previously
unexposed resist

7. Develop (MIF or IN developers)

Optimum resolution and
Line-width control with
more dilute developers

AZ 5214E Photoresist

Process Conditions

Dense Lines

FT: 1.25 μ m

SB: 100°C/ 42 sec

NIKON 0.54 NA i-Line

No PEB

AZ 300 MIF Developer ,70 sec double puddle @ 20.0°C



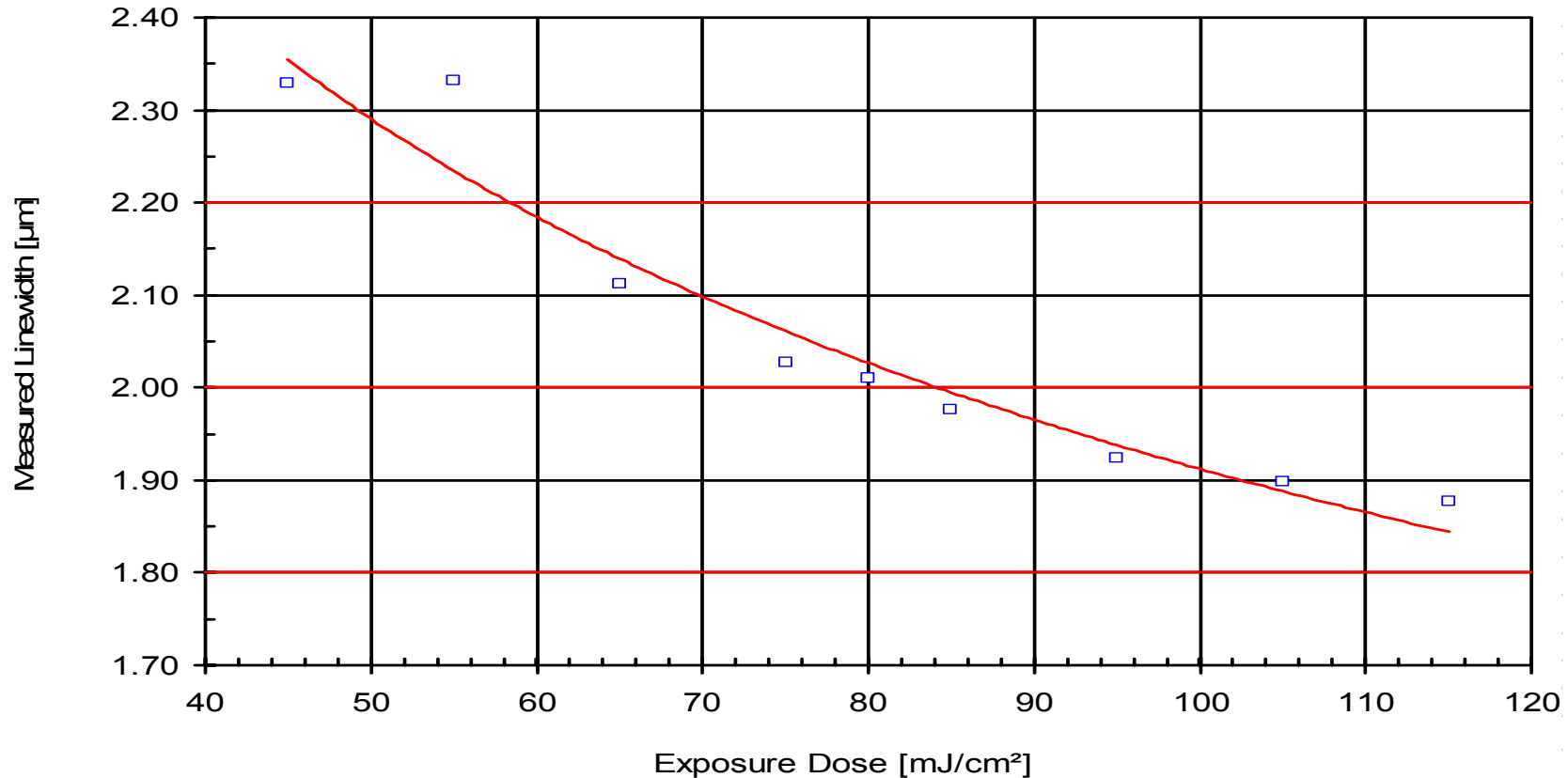
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AZ 5214E Photoresist

2.0 μm L/S Exposure Latitude on Si, FT = 1.25 μm

$E_{\text{nominal}} = 84 \text{ mJ/cm}^2$, Exposure Latitude = 81%



SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer ,70 sec double puddle @ 20.0°C



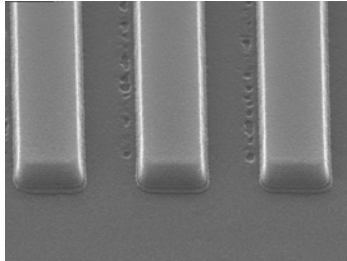
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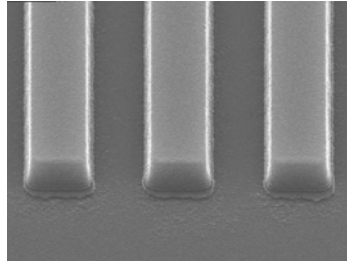
AZ 5214E Photoresist

2.0 μm L/S Exposure Latitude on Si, FT = 1.25 μm

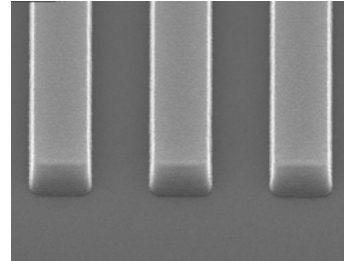
45mJ/cm²



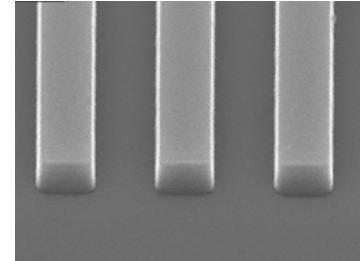
55mJ/cm²



65mJ/cm²

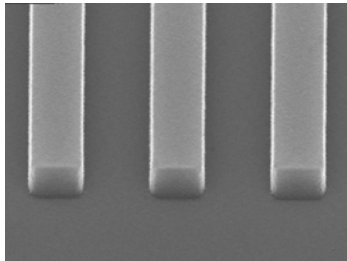
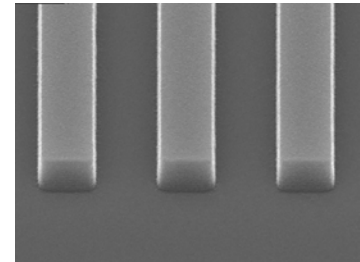


75mJ/cm²

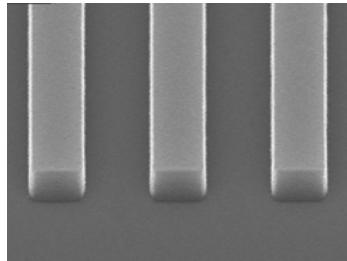


$E_{\text{nom}} = 84 \text{ mJ/cm}^2$
EXP.Lat. = 81%

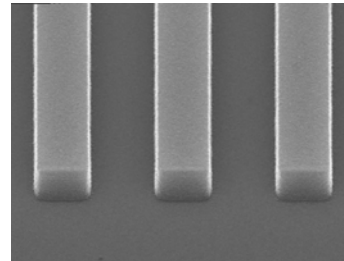
80mJ/cm²



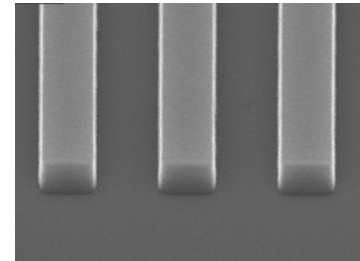
115mJ/cm²



105mJ/cm²



95mJ/cm²



85mJ/cm²

SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

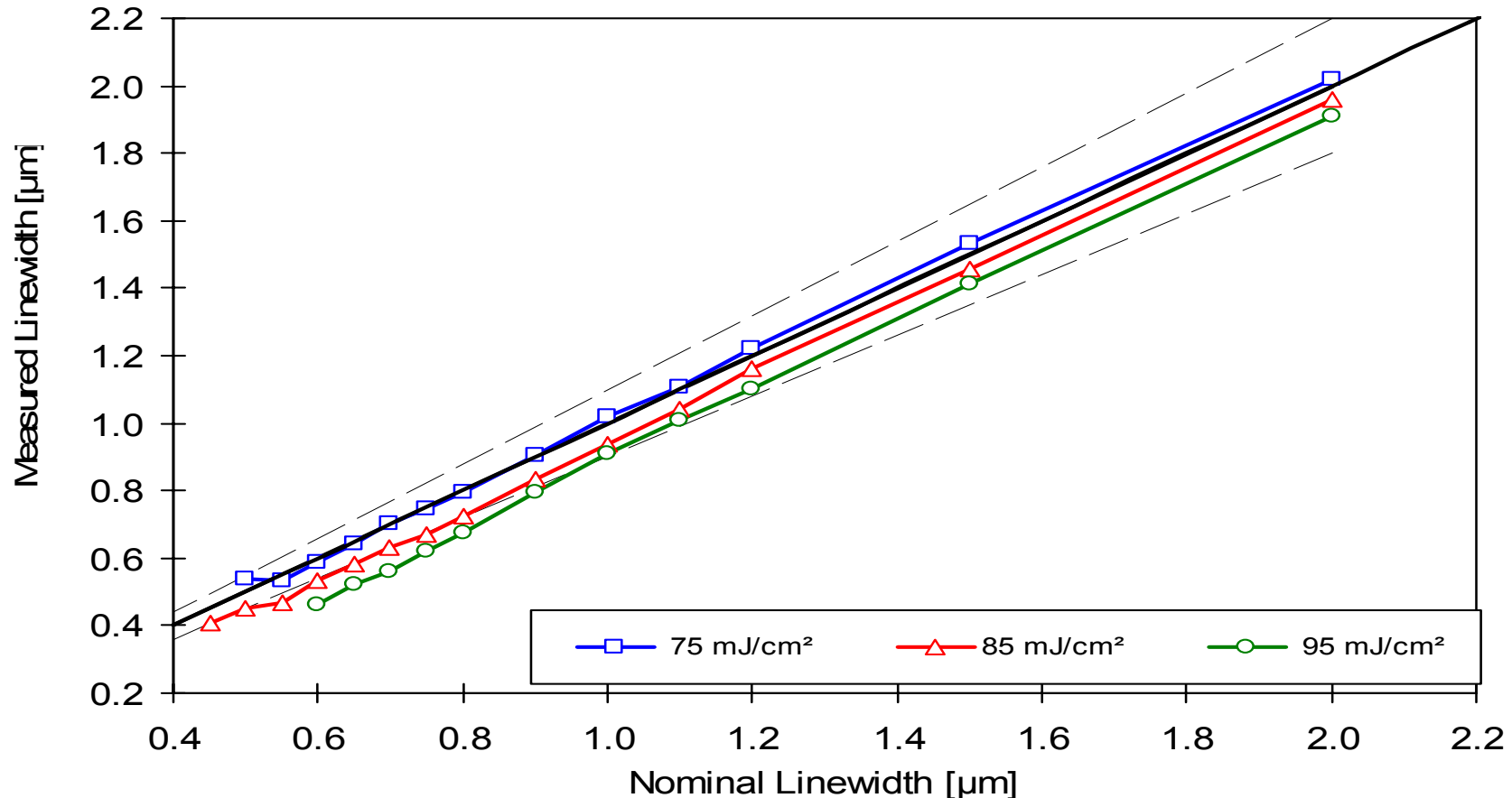


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AZ 5214E Photoresist

Linearity on Si, FT = 1.25 μm Focus = 0.0 μm



SB: 100°C, 42 sec; PEB: None

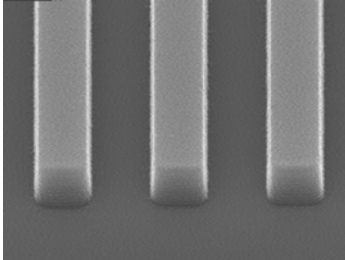
NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

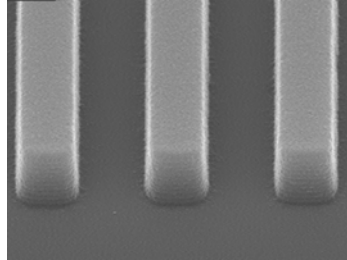
AZ 5214E Photoresist

Linearity on Si, FT = 1.25 μm

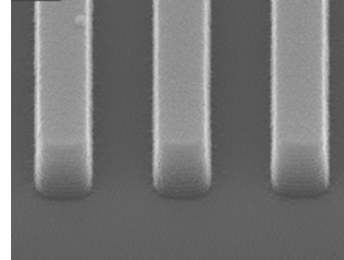
1.5 μm



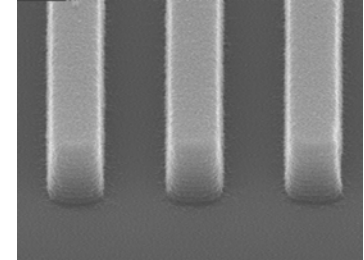
1.2 μm



1.1 μm

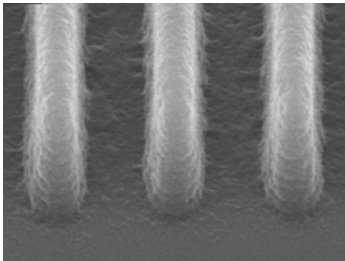
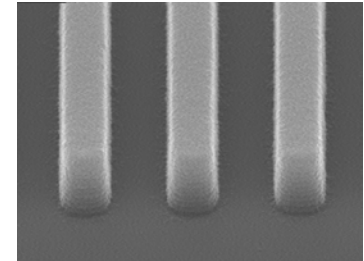


1.0 μm

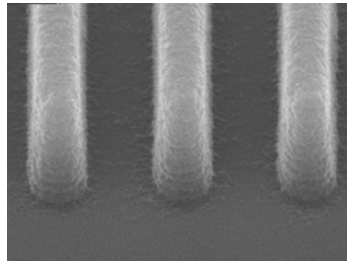


75 mJ/cm²

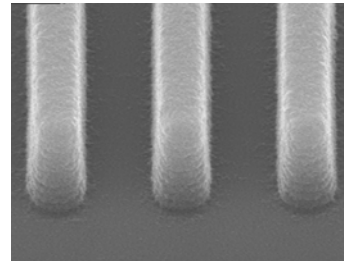
0.9 μm



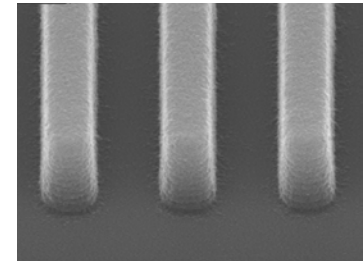
0.5 μm



0.6 μm



0.7 μm



0.8 μm

SB: 100°C, 42 sec; PEB: None

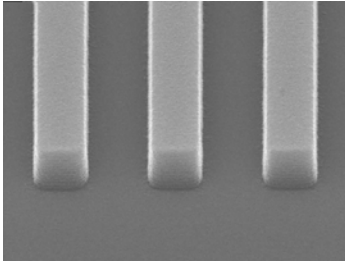
NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

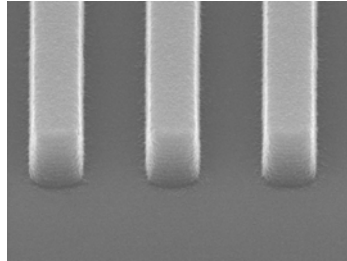
AZ 5214E Photoresist

Linearity on Si, FT = 1.25 μm

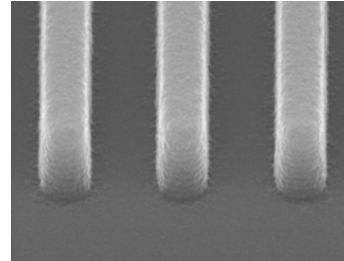
1.5 μm



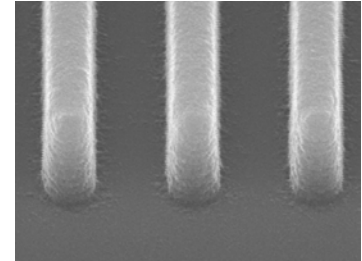
1.1 μm



0.8 μm

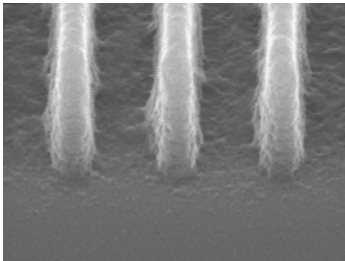
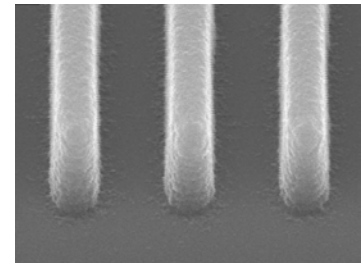


0.7 μm

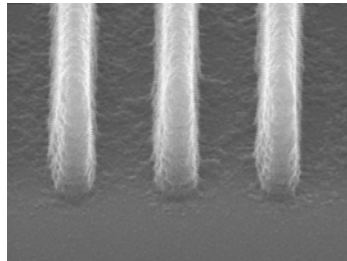


85 mJ/cm²

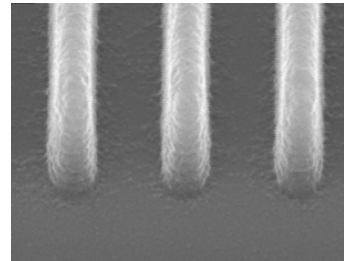
0.65 μm



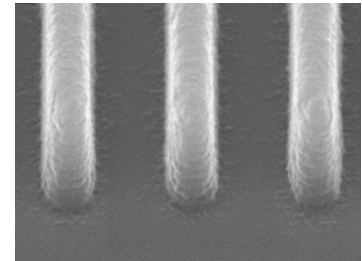
0.45 μm



0.5 μm



0.55 μm



0.6 μm

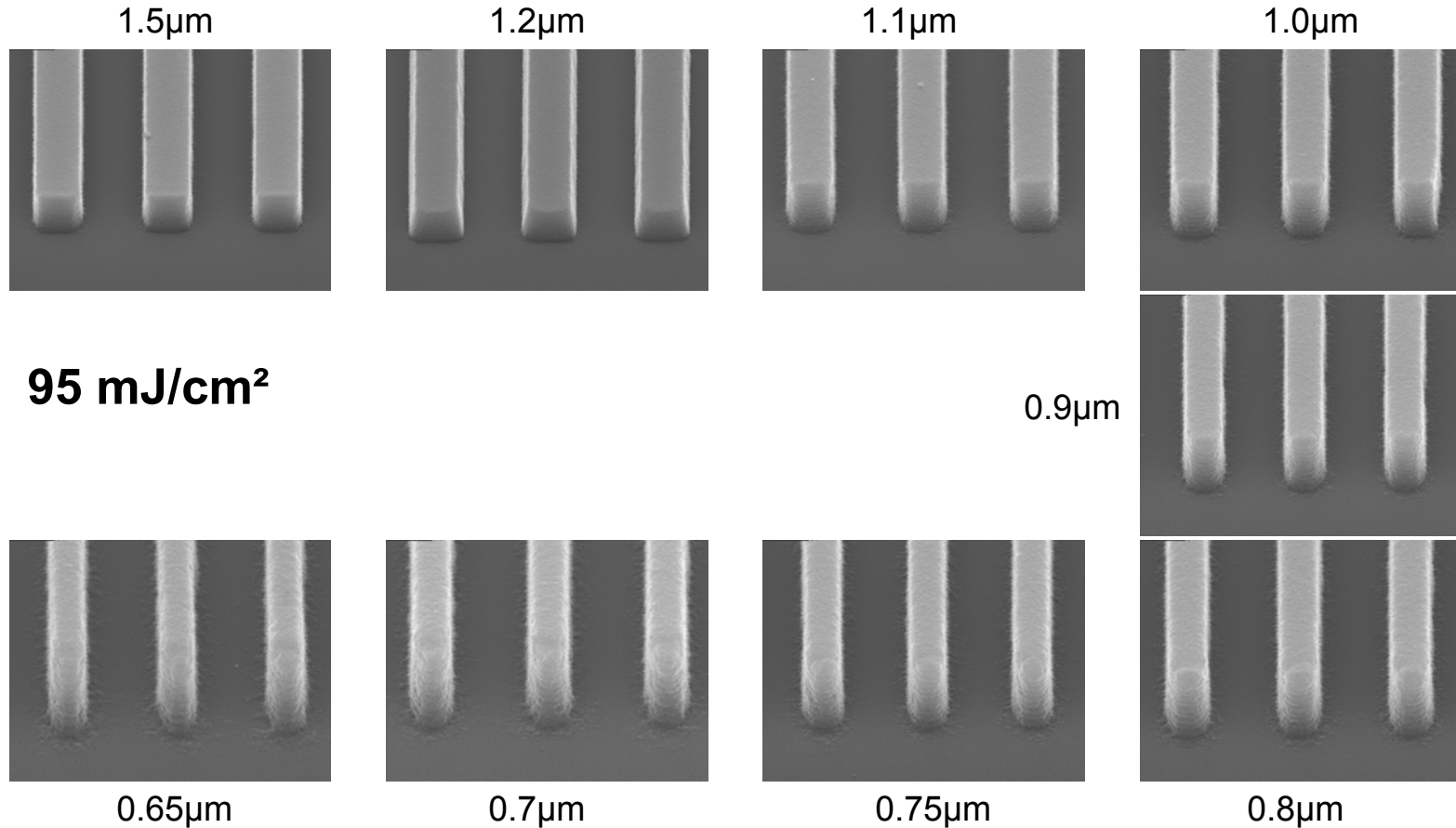
SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

AZ 5214E Photoresist

Linearity on Si, FT = 1.25 μm



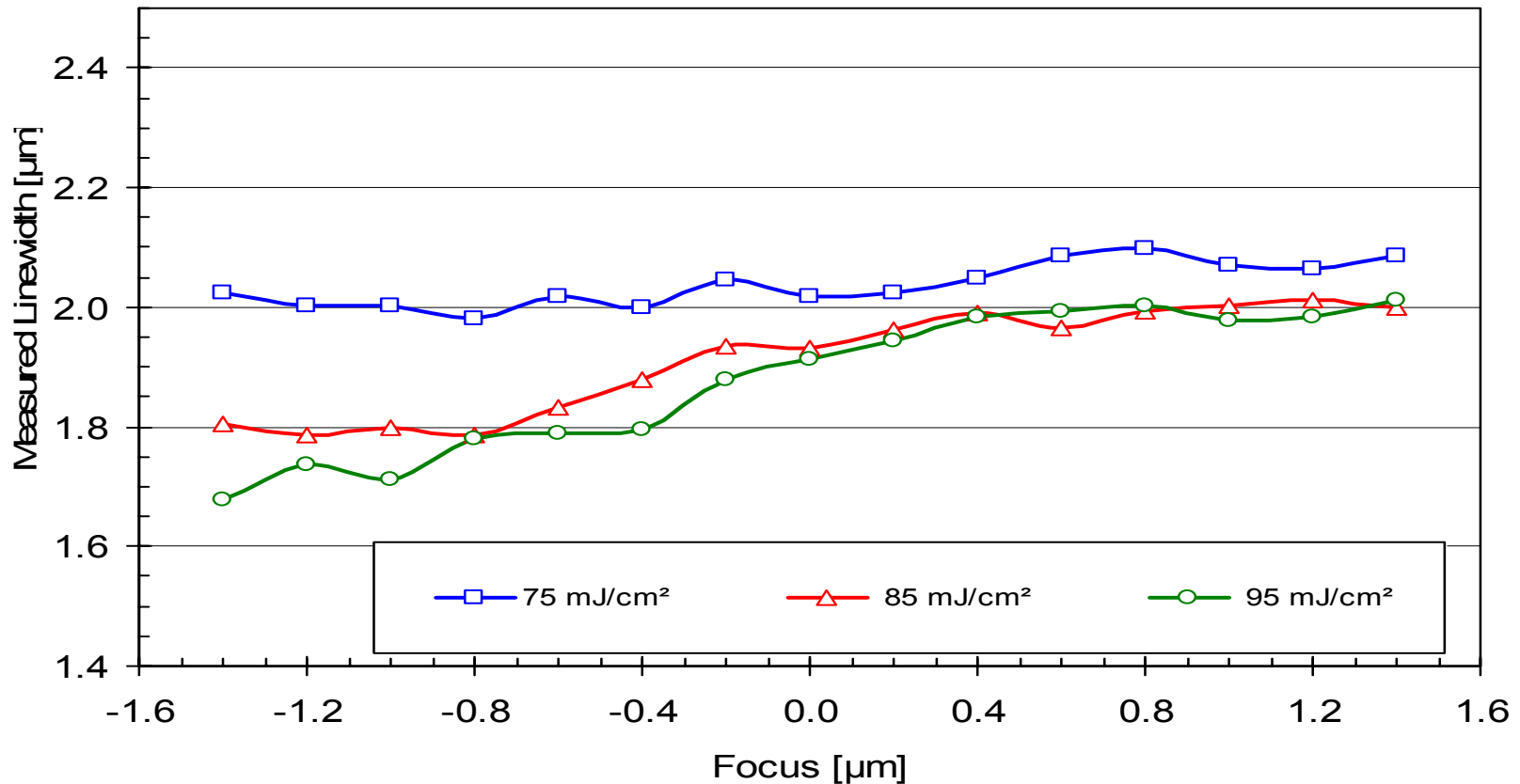
SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

AZ 5214E Photoresist

2.0 μm L/S Focus Latitude on Si, FT = 1.25 μm



SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

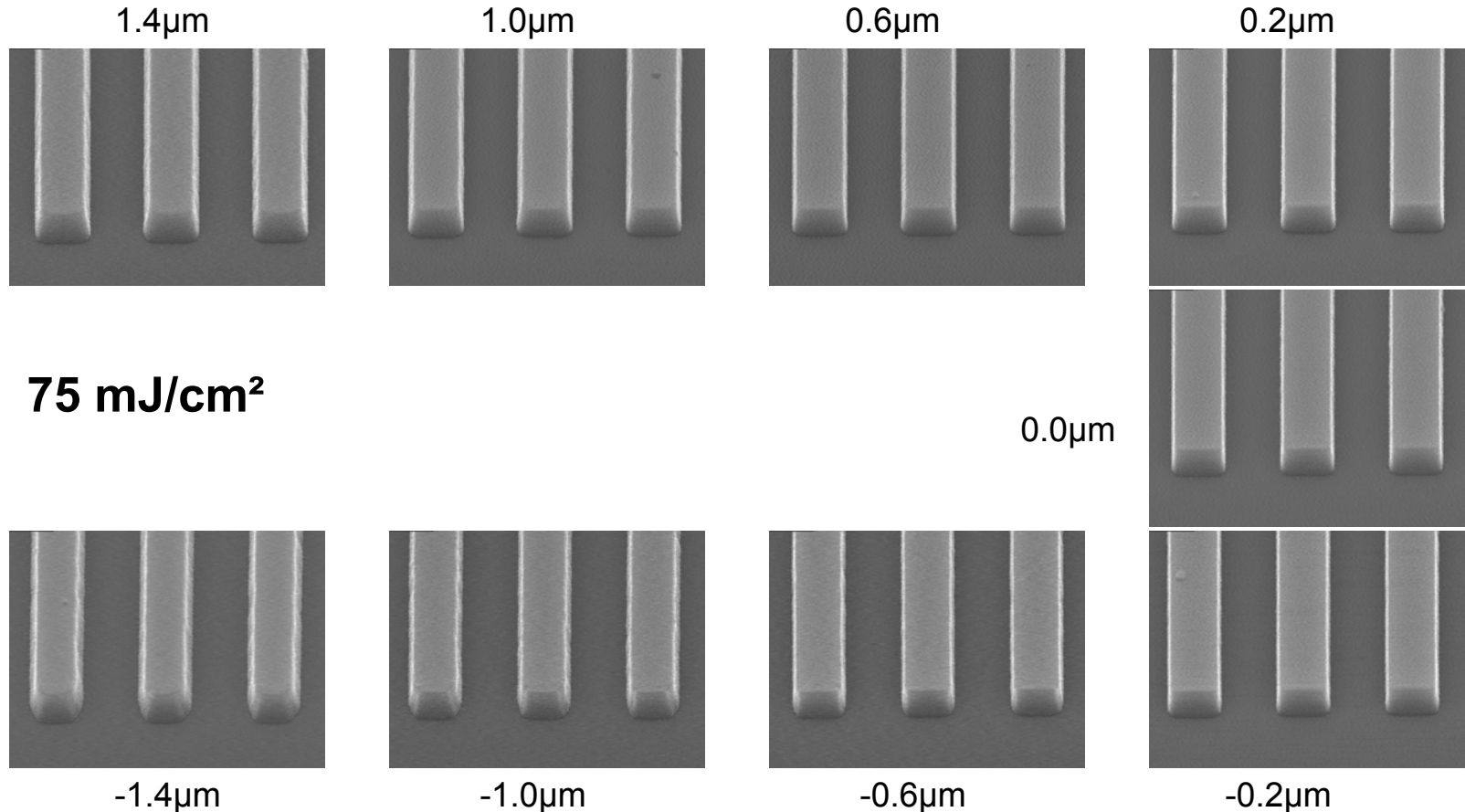


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AZ 5214E Photoresist

2.0 μm L/S Focus Latitude on Si, FT = 1.25 μm



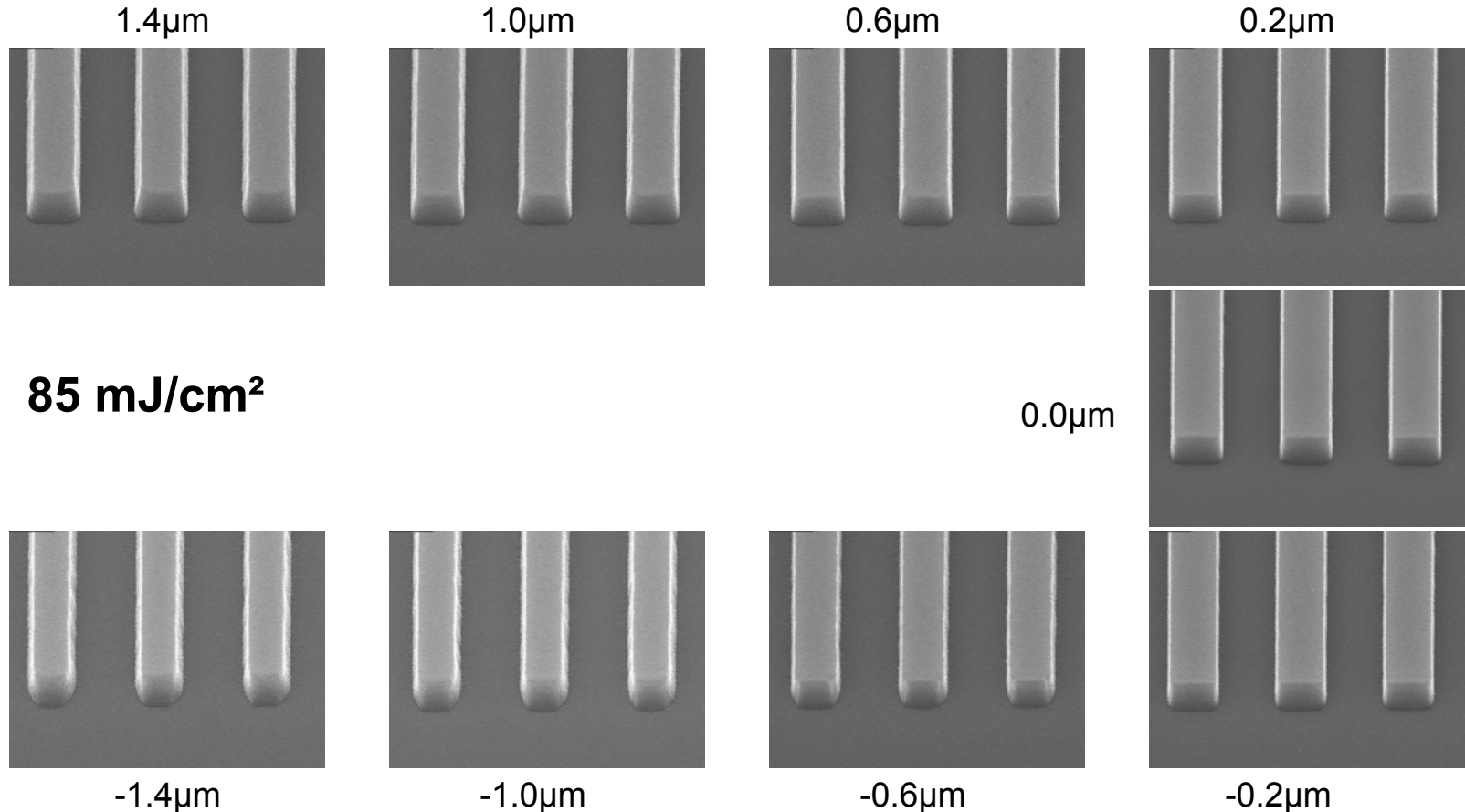
SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

AZ 5214E Photoresist

2.0 μm L/S Focus Latitude on Si, FT = 1.25 μm



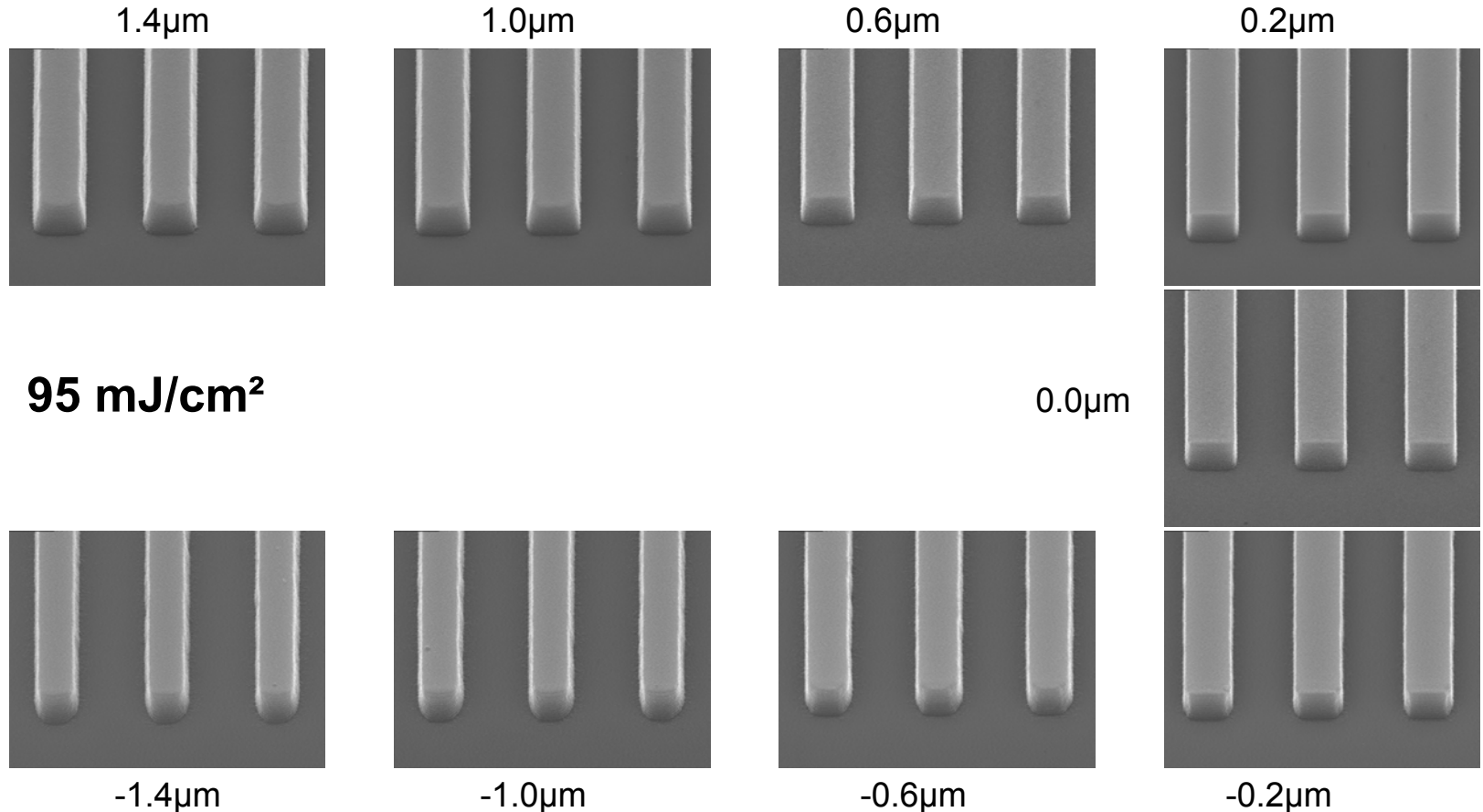
SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

AZ 5214E Photoresist

2.0 μm L/S Focus Latitude on Si, FT = 1.25 μm



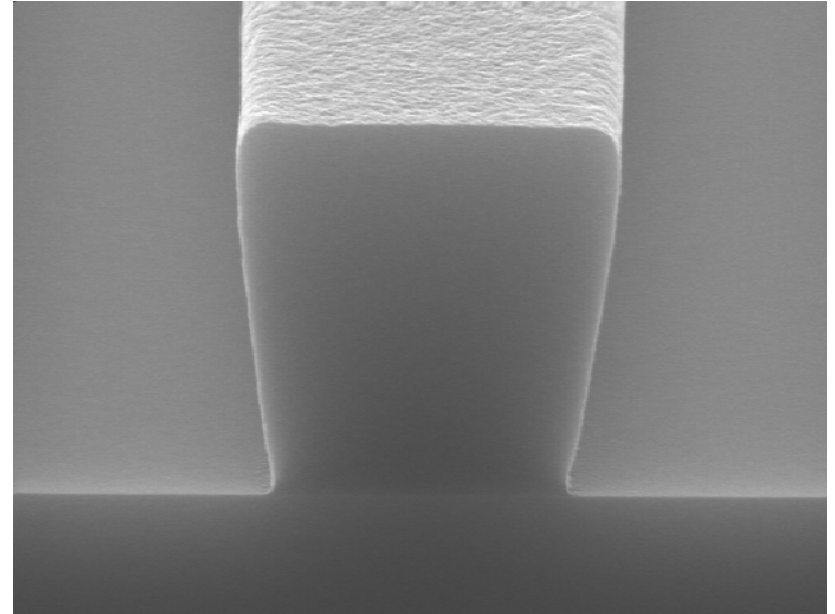
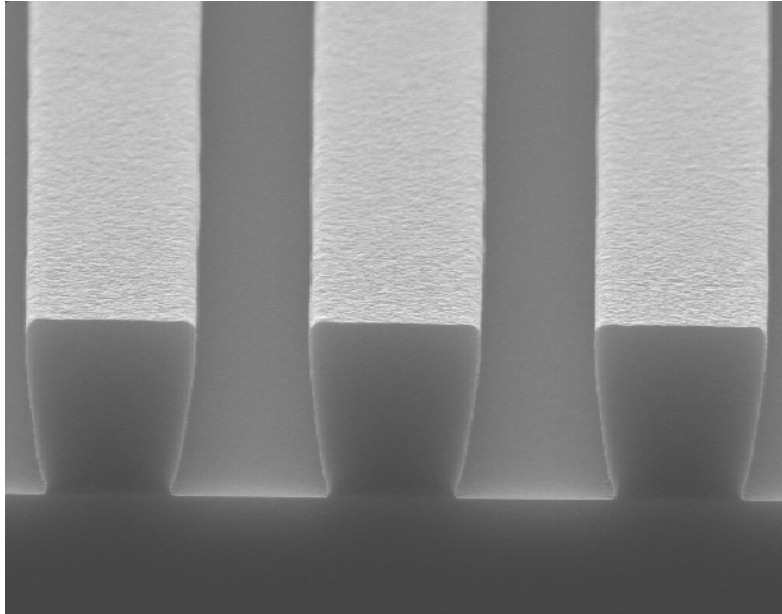
SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer, 70sec double puddle @ 20.0°C

AZ 5218-E Photoresist

3 μ m L/S Image Reversal Process



Process conditions

FT: 4 μ m, SB: 110°C/90 sec

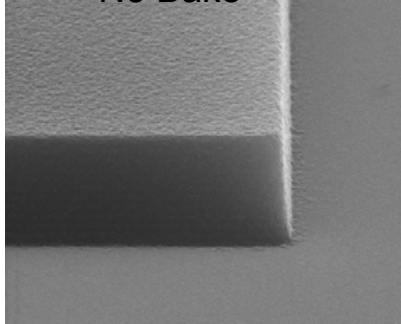
Exp. PE 400mJ/cm² with **i-Line** filter, PEB: 50°C/60sec then 110°C/90sec

Develop: AZ 917 MIF developer, 90sec spray @ room temperature

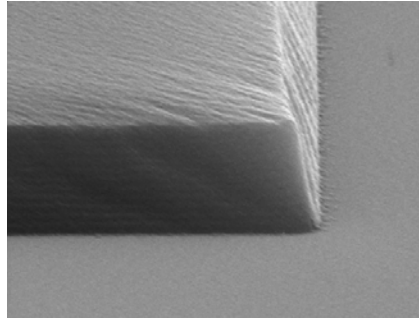
AZ 5214-E Photoresist

Thermal Stability of Large Pad

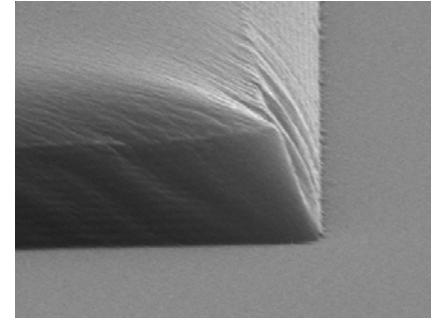
No Bake



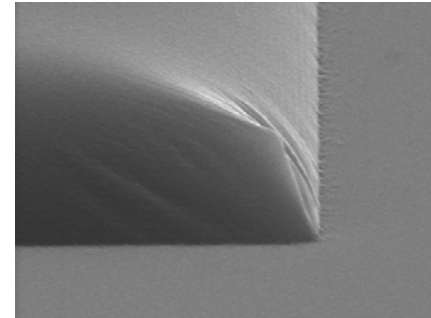
110°C



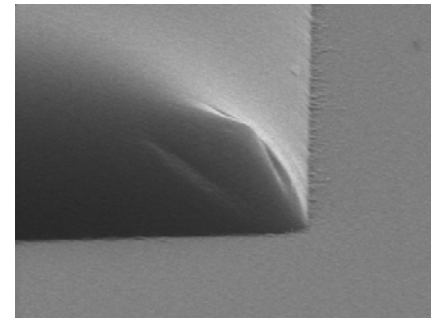
115°C



120°C



125°C



SB: 100°C, 42 sec; PEB: None

NIKON 0.54 NA i-Line

AZ 300 MIF Developer ,70sec double puddle @ 20.0°C

Hard Bake: 120 sec/ hot plate



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AZ 5214-E Photoresist

Process Conditions

Dense Lines

FT: 1.25 μ m

SB: 100°C/ 42 sec;

NIKON 0.54 NA i-Line

No PEB

AZ 1:1 Developer, 60 sec Immersion @ 24.5°C

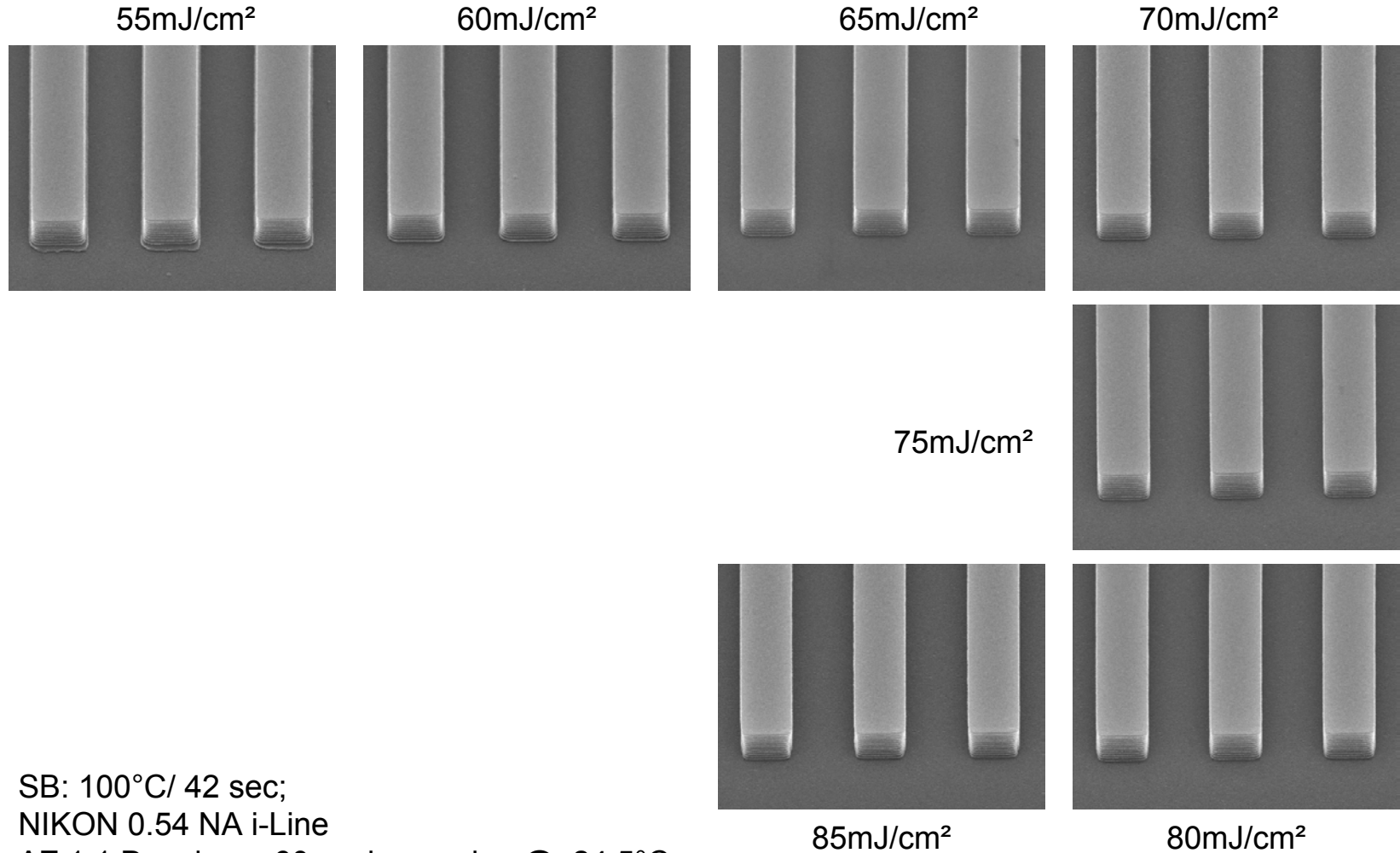


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AZ 5214-E Photoresist

Exposure Latitude 2.0 μm L/S on Si, FT = 1.25 μm

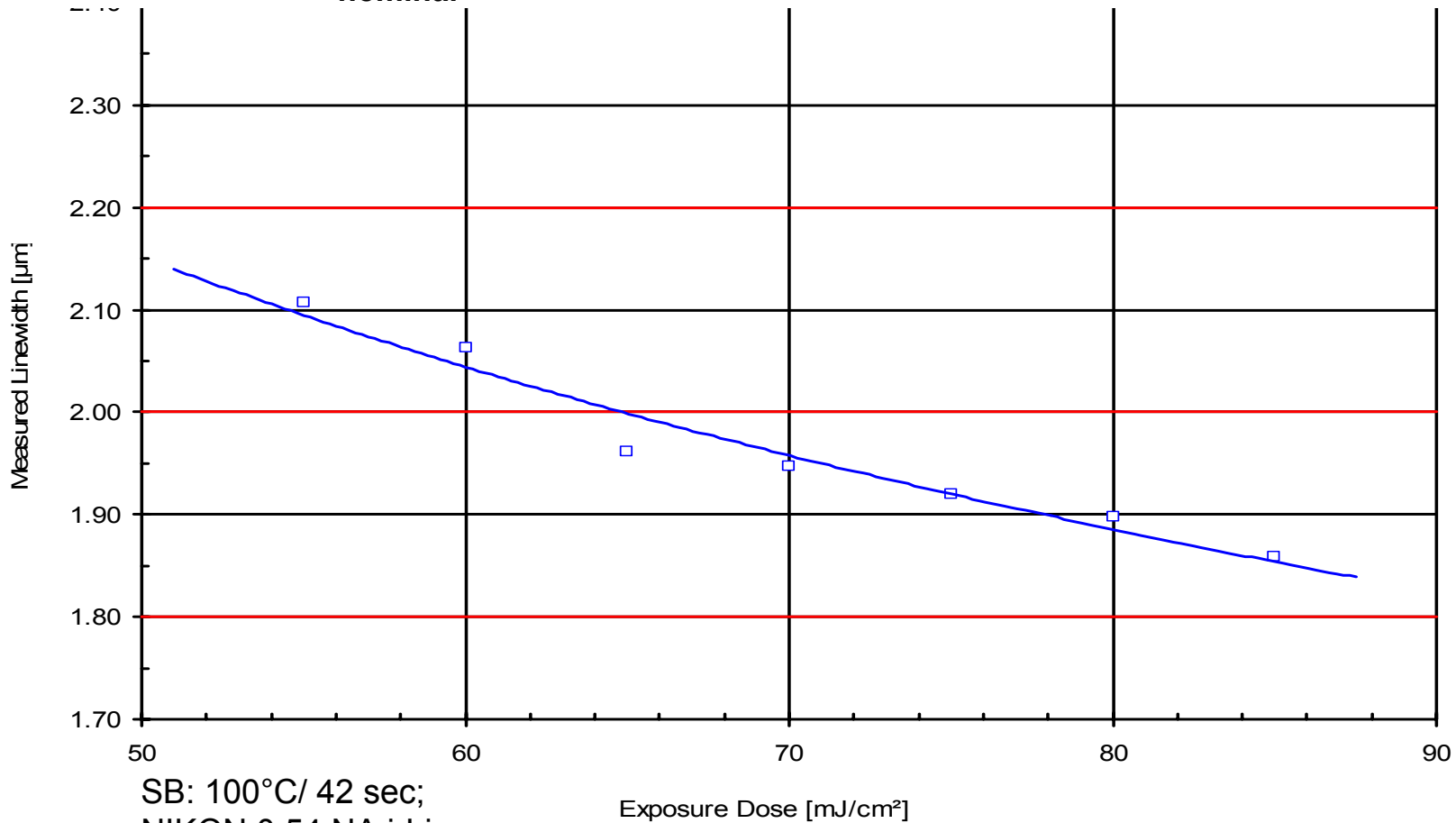


SB: 100°C/ 42 sec;
NIKON 0.54 NA i-Line
AZ 1:1 Developer 60sec immersion @ 24.5°C

AZ 5214-E Photoresist

Exposure Latitude 2.0 μm L/S on Si, FT = 1.25 μm

$E_{\text{nominal}} = 68 \text{ mJ/cm}^2$, Exposure Latitude = 59%



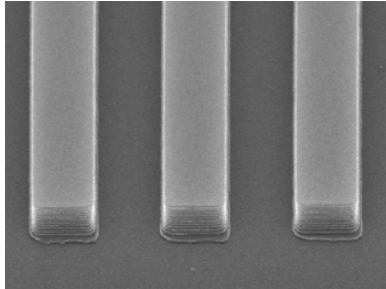
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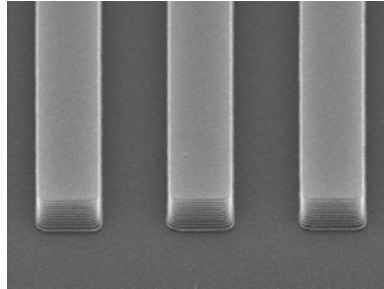
AZ 5214-E Photoresist

Exposure Latitude 2.0 μm L/S on Si, FT = 1.25 μm

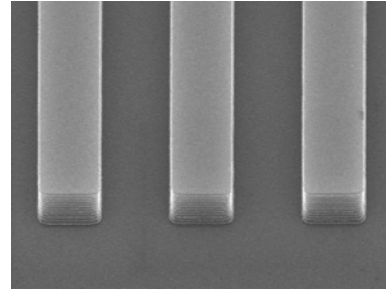
55mJ/cm²



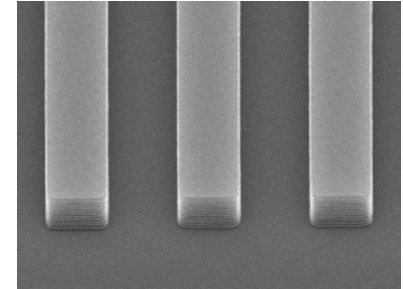
60mJ/cm²



65mJ/cm²

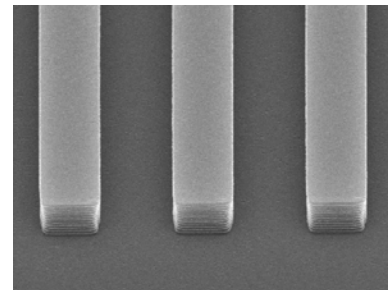
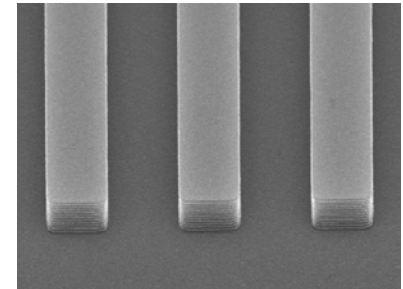


70mJ/cm²

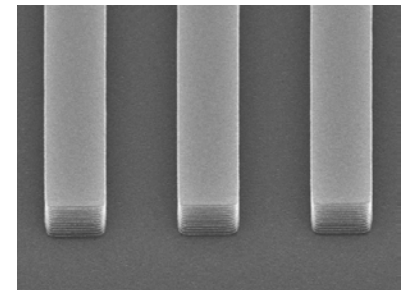


E_{nom} = 68 mJ/cm²
Exp.Lat. = 59%

75mJ/cm²



85mJ/cm²

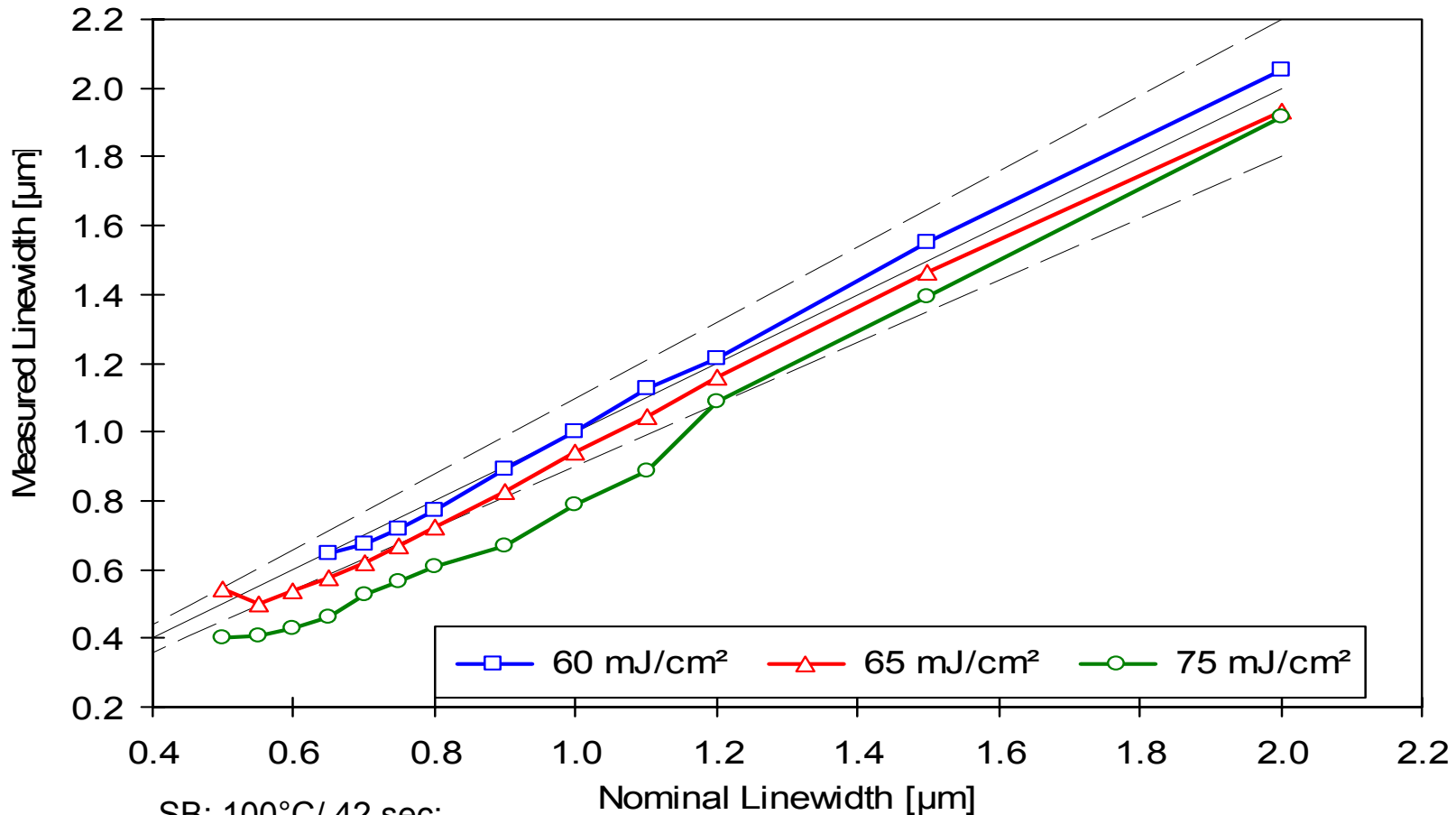


80mJ/cm²

SB: 100°C/ 42 sec;
NIKON 0.54 NA i-Line
AZ 1:1 Developer 60sec immersion @ 24.5°C

AZ 5214-E Photoresist

Linearity on Si, FT = 1.25 μ m



SB: 100°C/ 42 sec;
NIKON 0.54 NA i-Line
AZ 1:1 Developer 60sec immersion @ 24.5°C



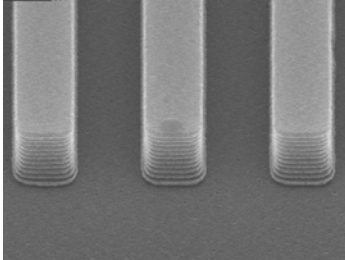
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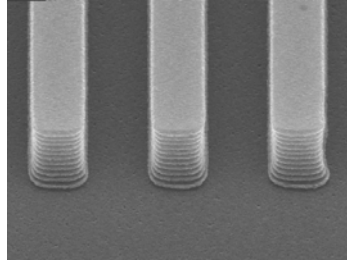
AZ 5214-E Photoresist

Linearity on Si, FT = 1.25 μ m

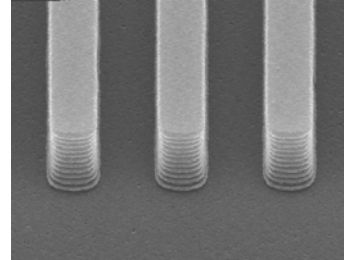
1.2 μ m



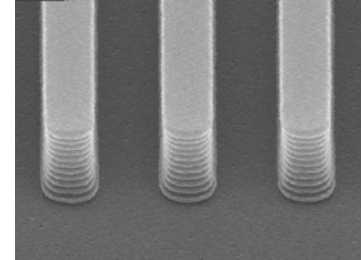
1.0 μ m



0.90 μ m

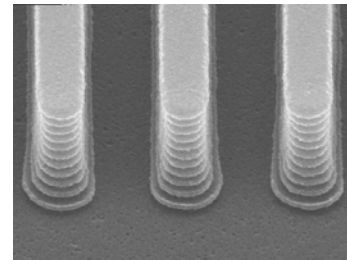
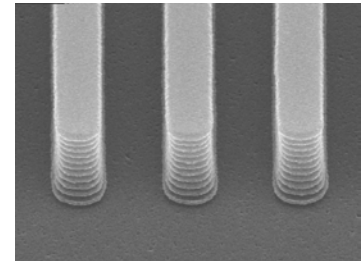


0.80 μ m

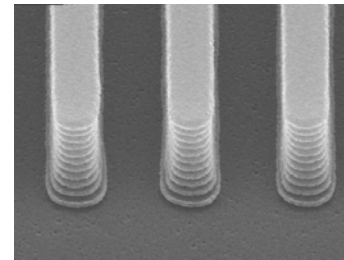


60 mJ/cm²

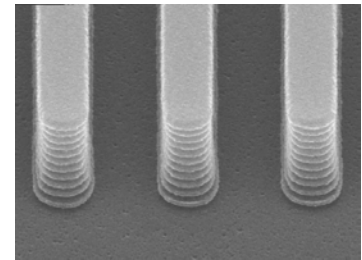
0.75 μ m



0.60 μ m



0.65 μ m



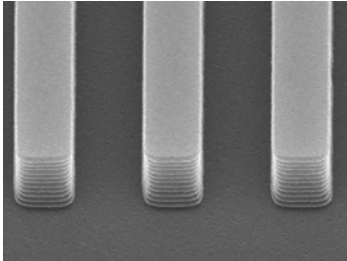
0.70 μ m

SB: 100°C/ 42 sec;
NIKON 0.54 NA i-Line
AZ 1:1 Developer 60sec immersion @ 24.5°C

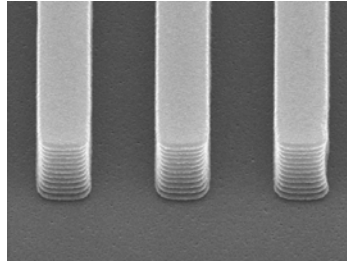
AZ 5214-E Photoresist

Linearity on Si, FT = 1.25 μ m

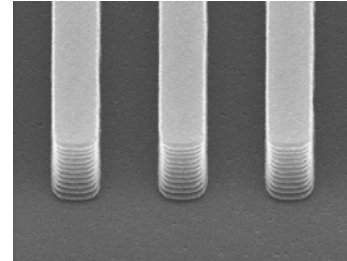
1.2 μ m



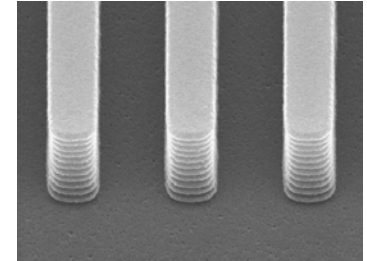
1.0 μ m



0.90 μ m

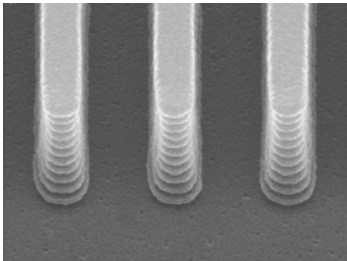
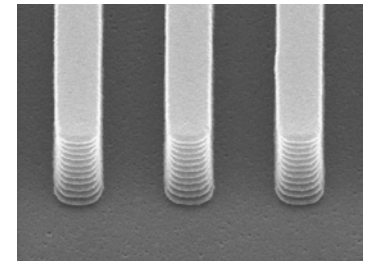


0.80 μ m

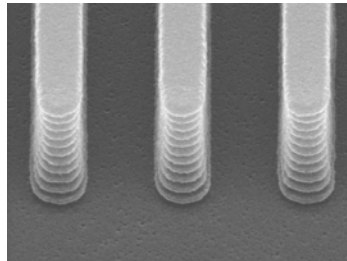


65 mJ/cm²

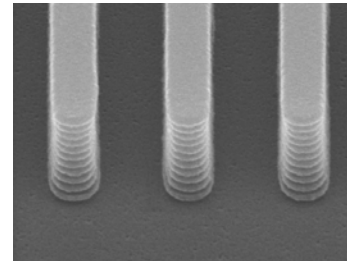
0.75 μ m



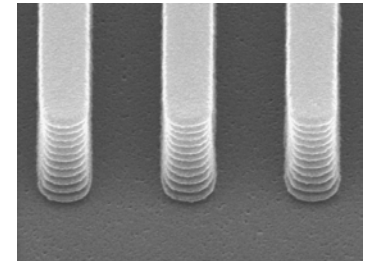
0.55 μ m



0.60 μ m



0.65 μ m



0.70 μ m

SB: 100°C/ 42 sec;

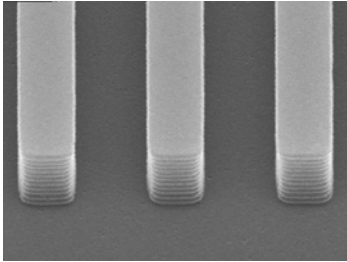
NIKON 0.54 NA i-Line

AZ 1:1 Developer 60sec immersion @ 24.5°C

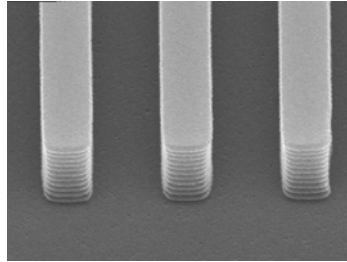
AZ 5214-E Photoresist

Linearity on Si, FT = 1.25 μ m

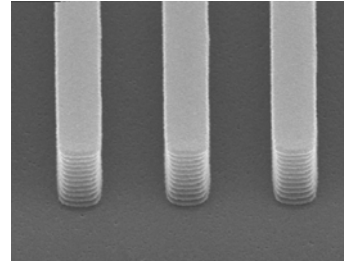
1.2 μ m



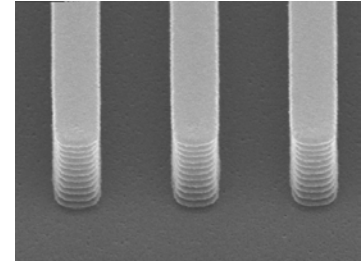
1.0 μ m



0.90 μ m

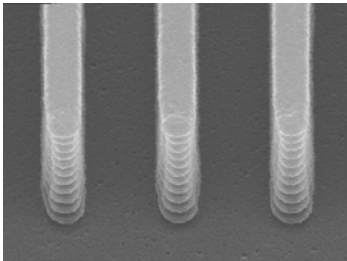
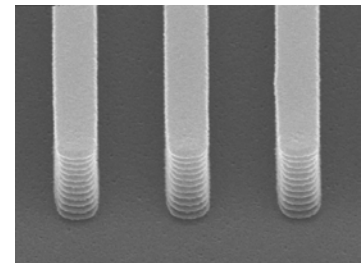


0.80 μ m

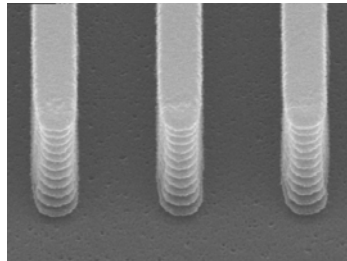


75 mJ/cm²

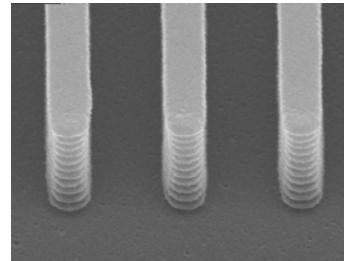
0.75 μ m



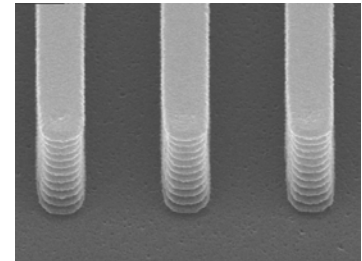
0.55 μ m



0.60 μ m



0.65 μ m



0.70 μ m

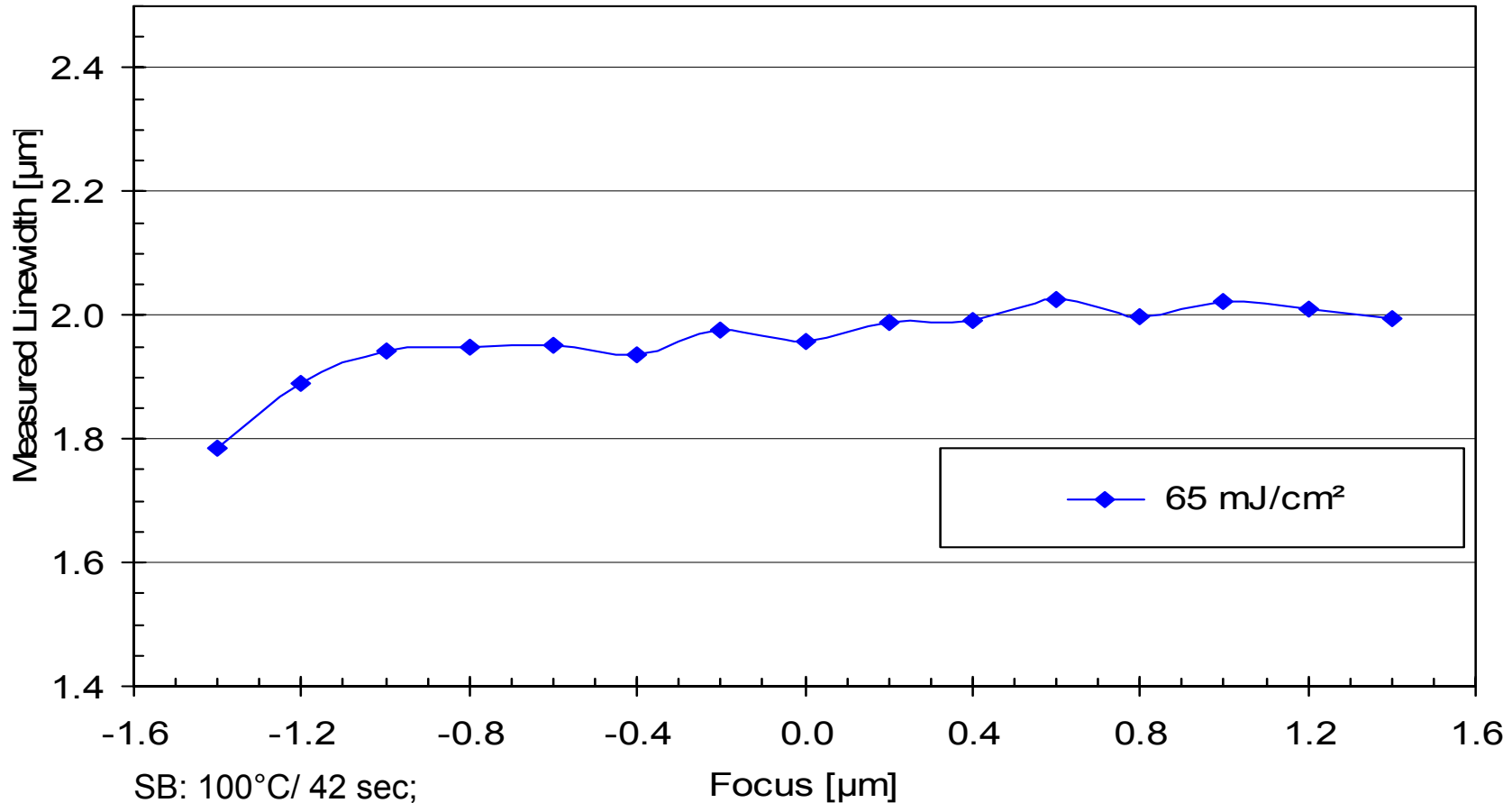
SB: 100°C/ 42 sec;

NIKON 0.54 NA i-Line

AZ 1:1 Developer 60sec immersion @ 24.5°C

AZ 5214-E Photoresist

Focus Latitude 2.0 μm L/S on Si, FT = 1.25 μm



SB: 100°C/ 42 sec;

NIKON 0.54 NA i-Line

AZ 1:1 Developer 60sec immersion @ 24.5°C

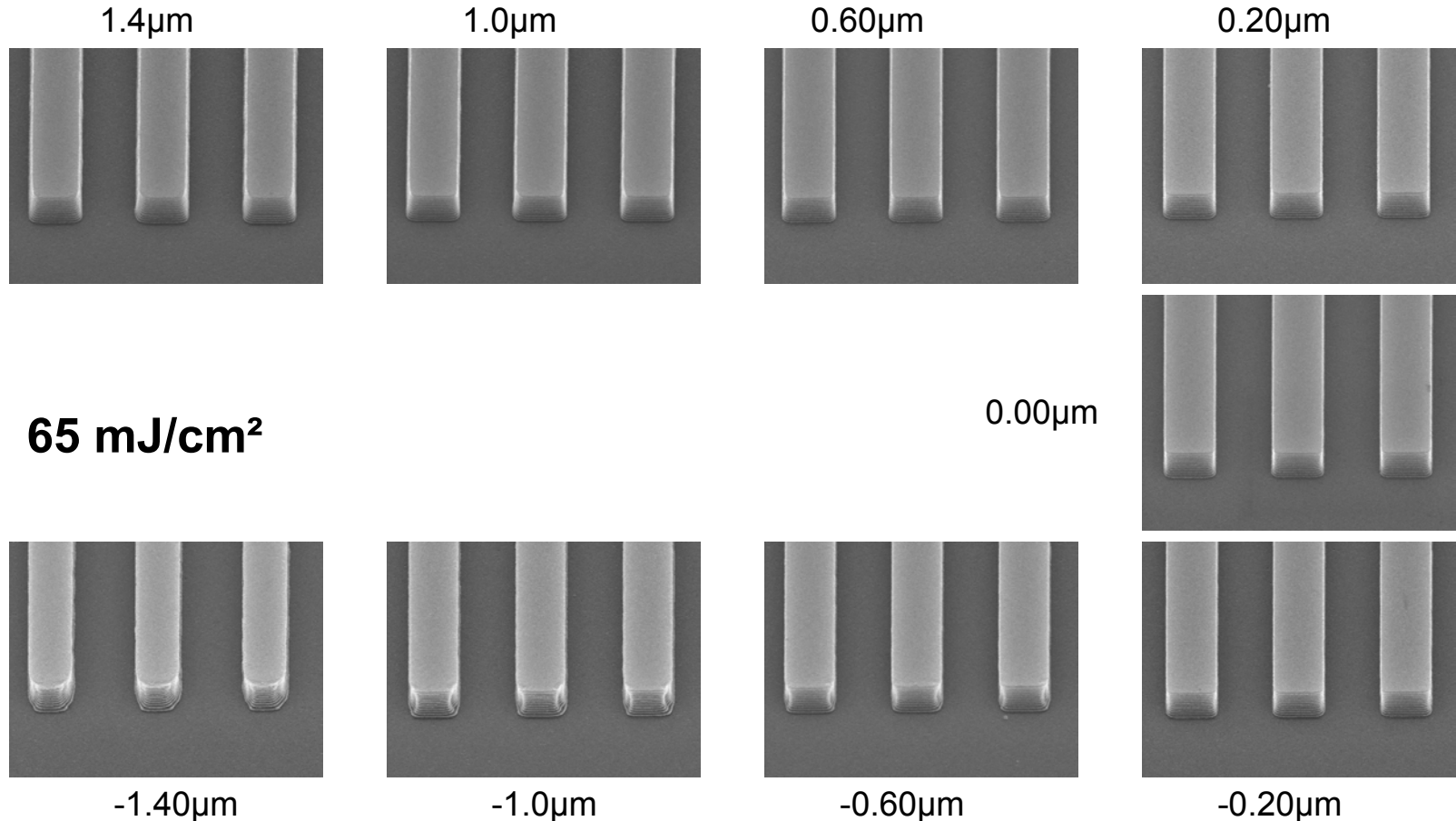


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AZ 5214-E Photoresist

Focus Latitude 2.0 μm L/S on Si, FT = 1.25 μm



SB: 100°C/ 42 sec;

NIKON 0.54 NA i-Line

AZ 1:1 Developer 60sec immersion @ 24.5°C