AR-P 3740 Standard Positive i-Line Photoresists

Sensitive photoresist for the production of sub-um semiconductor devices

AR-P 3740 產品說明

AR-P 3740 產品為高敏感度正型i-line光阻，適合次微米高密度積體電路製程。
產品基本資料如下：

		AR-P 3740
Film thickness@4000rpm	um	1.4
Resolution	um	0.4
Contrast		6.0
Flash point	°C	42
Storage 6 months★1	°C	10 - 18
Production status★2		routine

★1 Product is guaranteed 6 months shelf life from the data of sale if stored correctly.
在正確的儲存條件下,產品保證的有效期為銷售日起6個月
Product can also be used without guarantee until the date indicated on the label
在無提供保證的情況下,產品可使用至標籤上所示的有效期

★2 Production status：
on-demand：產品無固定排程生產，需先詢問價格。可能會有最小量訂單，或需等待批次生產排程。
Routine： 產品固定排程生產，交貨期約 2 - 4 週。

產品包裝:

✅ 250 ml/瓶
✅ 1 L /瓶
其它包裝可依客戶需求增加.

✏️ 價格詢問 ✏️ 其它諮詢

出貨:

✅ 2 – 4 週。德國運出。
❎ 1 週。國內庫存。
(目前暫無國內庫存)

AR-P 3740 GHS 標識

AR-P 3740 Standard Positive i-Line Photoresists

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Characterization 產品特性

- broadband UV, i-line, g-line
  曝光波長: 寬頻紫外線, i-line (365nm) , g-line (436nm)
- high sensitivity, highest resolution up to 0.4 µm
  高敏感度,最高解析度可達0.4 um
- high contrast, excellent dimensional accuracy
  高對比,尺寸精確度良好
- optimized coating properties on topologically complex substrate surfaces
  塗佈特性適合基板表面複雜的高低結構
- 3840 colored to prevent the effect of standing waves
  AR-P 3840染料參雜以避免駐波效應
- plasma etching resistant, temperature-stable up to 120 °C
  耐電漿蝕刻,耐溫可達120°C
- combination of novolac and naphthoquinone diazide
  主要成份為酚醛樹酯及叠氮基萘醌
- safer solvent PGMEA
  使用較安全溶劑丙二醇單甲醚醋酸酯

AR-P 3740 Standard Positive i-Line Photoresists

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Property I			
Parameter		AR-P 3740	
Solids content	%	29	
Viscosity@25°C	mPa.s	22	
Film thickness@4000rpm	um	1.4	
Resolution	um	0.4	
Contrast		6.0	
Flash point	°C	42	
Storage 6 months	°C	10 - 18	
Property II			
Glass trans. temperature	°C	108	
Dielectric constant		3.1	
Cauchy coefficients (AR-P 3740)	N_0	1.623	
	N_1	81.8	
	N_2	160.4	
Plasma etching rate 5 Pa, 240-250 V Bias	nm/min	Ar-sputtering	8
		O_2	164
		CF_4	38
		80 CF_4 +16 O_2	88

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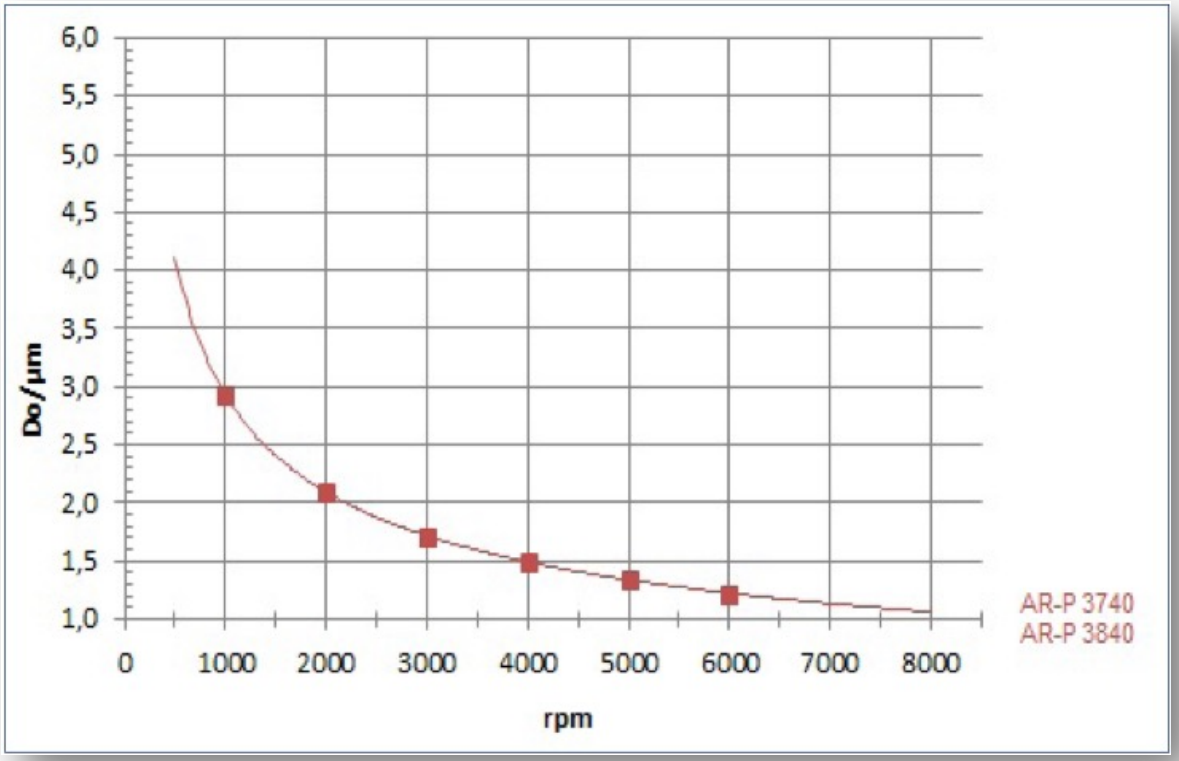
AR-P 3740 Spin curve



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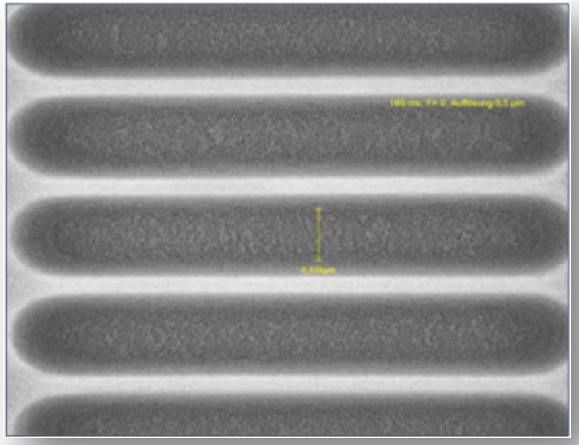
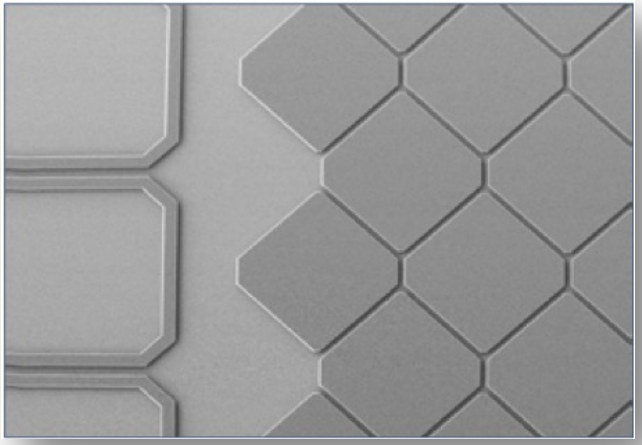
Structure resolution



AR-P 3740 Film thickness 1.1 µm
Resist structures 0.5 µm L/S

Resist structures



AR-P 3740 Film thickness 1.8 µm
Resist structures up to 1.0 µm

Process parameter

Substrate	Si 4” wafer
Soft-bake	100°C x 90 sec, hot plate
Exposure	i-line stepper (NA: 0.65)
Development	AR 300-47, 60 sec ,22°C

Process chemicals

Adhesion promoter	AR 300-80
Developer	AR 300-47/AR 300-26
Thinner	AR 300-12
Remover	AR 300-76, AR 600-71

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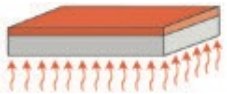
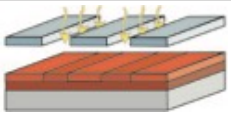
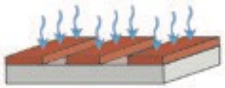
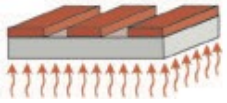
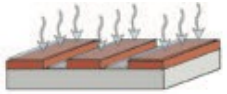
This diagram shows exemplary process steps for AR-P 3740 resists. All specifications are guideline values which must be adapted to own specific conditions. For further information on processing, 👉" Detailed instructions for optimum processing of photoresists". For recommendations on wastewater treatment and general safety instructions, 👉"General product information on Allresist photoresists".

圖示AR-P 3740產品的製程參數的範例. 所有參數為參考值,使用者應依設備環境實際狀況加以調整

Coating		AR-P 3740 1.4 um@4000rpm x 60 sec
Soft bake (±1 °C)		100°C x 1 min, hot plate. or, 95°C x 25 min, convection oven
UV exposure		Broadband UV, 365nm, 405nm, 436nm/Dose (E_0, stepper) 55 mJ/cm^2
Development (21-23±0.5°C) puddle		AR 300-47 x 60 sec
Rinse		DI water, 30 sec
Post-bake (optional)		115°C x 1 min, hot plate. or, 115°C x 25 min convection oven
Customer specific technology		Generation of semiconductor properties
Removal		AR 300-76 or O2 plasma ashing

AR-P 3740 Standard Positive i-Line Photoresists

Sensitive photoresist for the production of sub-um semiconductor devices

Reference data for process tuning

Development recommendations

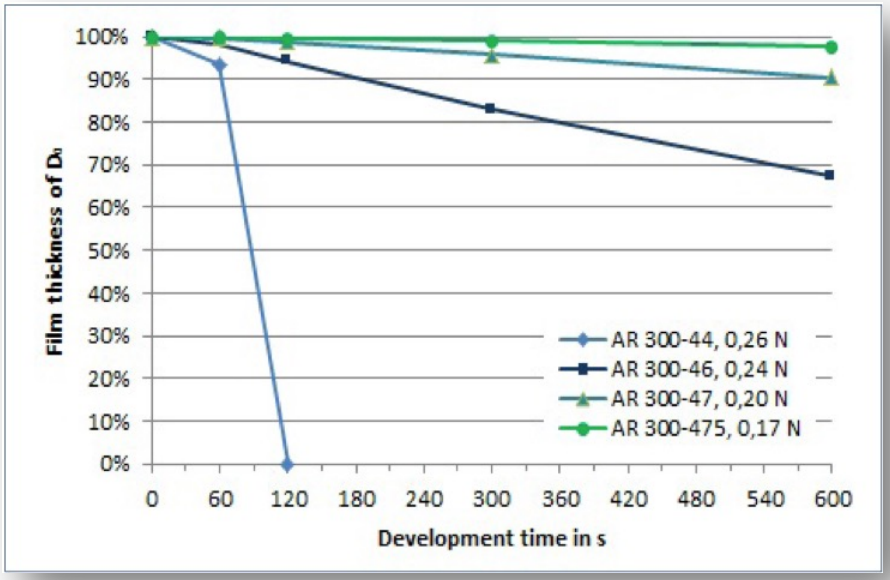
Resist	Developer		
	AR 300-26	AR 300-35	AR 300-40
AR-P 3740/AR-P 3840	1 : 3	4 : 1	AR 300-46 high speed AR 300-47 high contrast

AR-P 3740 Standard Positive i-Line Photoresists

Sensitive photoresist for the production of sub-um semiconductor devices

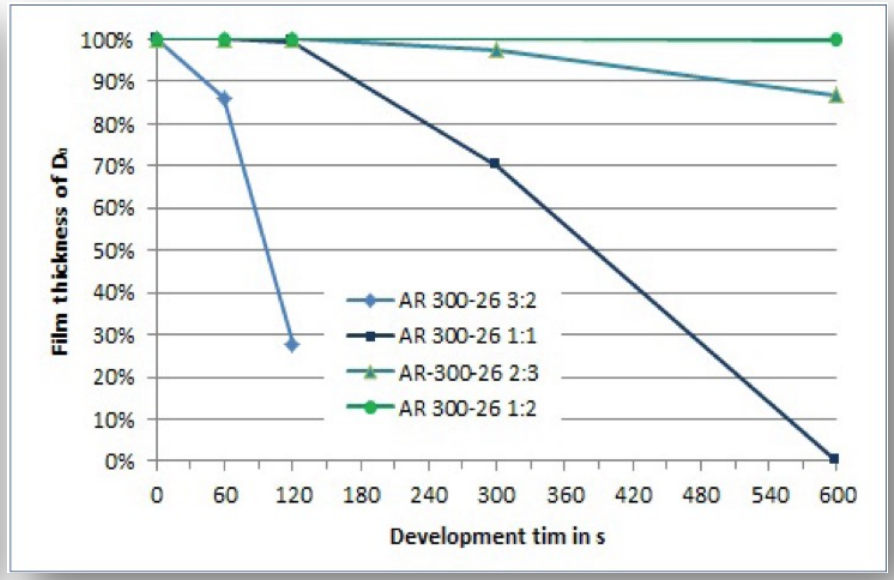
Reference data for process tuning

Dark erosion



AR-P 3740 may be developed with any of the four TMAH developers. A high sensitivity is associated with high erosion rates. No dark erosion is obtained if weaker developers are chosen (see diagram Influence of developer strength)

Dark erosion



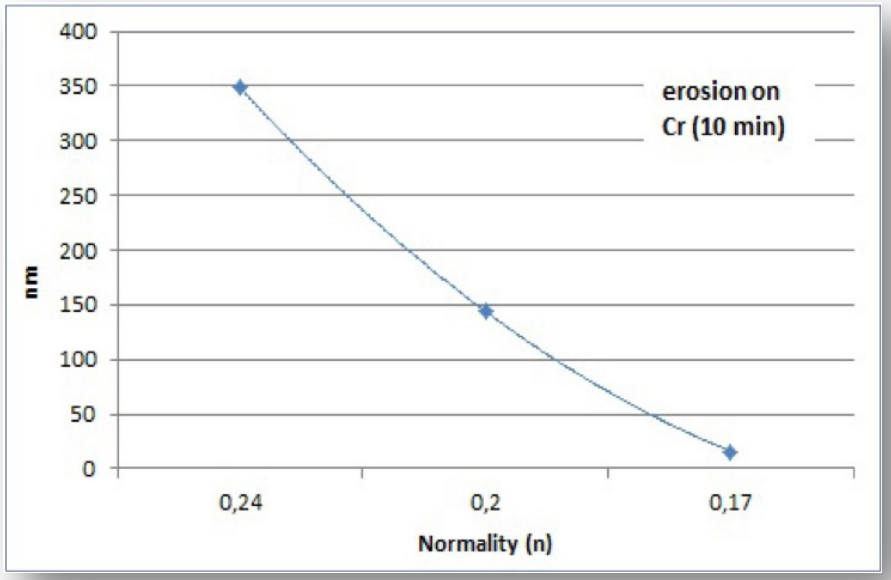
Using a dilution series of AR 300-26, the desired development properties can be adjusted accordingly. A dilution of 3:2 (3 parts AR 300-26, 2 parts DI water) is not recommended, due to the high erosion rate. More suitable in this case is a dilution of 1:1 to 2:1.

AR-P 3740 Standard Positive i-Line Photoresists

Sensitive photoresist for the production of sub-um semiconductor devices

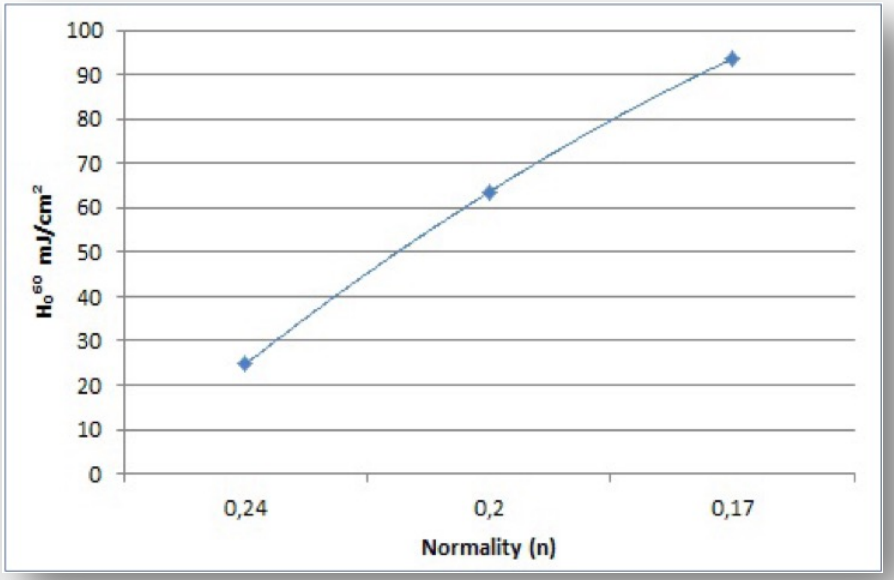
Reference data for process tuning

Influence of developer strength of the dark erosion



Using coated Cr-substrates (thickness 1.5 µm), 15 – 350 nm are removed within 10 min depending on the respective developer strength. The highest erosion is obtained with the strong developer AR 300-46 (0.24 n).

Influence of developer strength of exposure dose



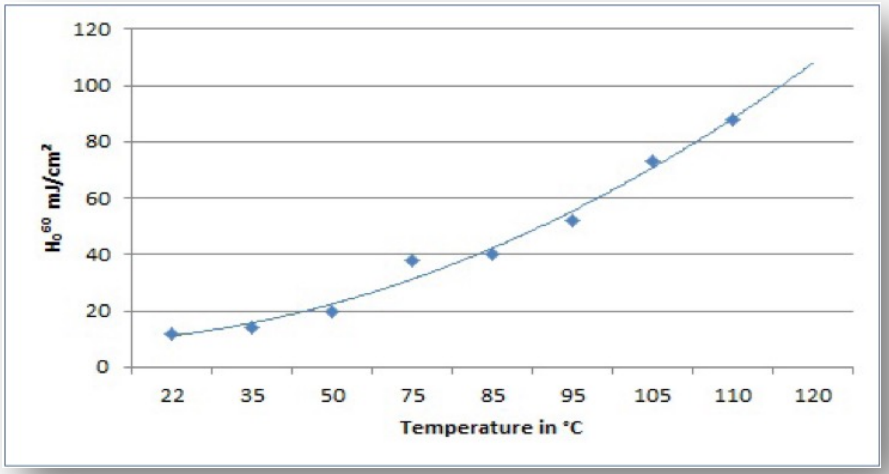
Using the strong developer AR 300-46, short exposure times can be realized. The highest contrast and thus a slightly higher resolution is obtained with the weak developer AR 300-475 (0.17 n).

AR-P 3740 Standard Positive i-Line Photoresists

Sensitive photoresist for the production of sub-um semiconductor devices

Reference data for process tuning

Dependency of sensitivity (exposure dose) on resist drying



	Temperature °C	Time	H_0^{60} mJ/cm²
Room	22	24 hour	12
Convection Oven	35	4 hour	14
	50	1 hour	20
	75	30 min	38
	85		40
	95		52
	105		73
	110		83
	120		- -

performed by bb UV with developer 300-35 1 : 1

It is also possible to develop resists which were only dried at room temperature (24 h). In this case, resists are technically very sensitive, but are however also characterized by high dark erosion. A good development is provided for resists baked at up to 110 °C (AR 300-35, 1 : 1), while developers with higher strength are required for bake temperatures above 120 °C (AR 300-35, 2 : 1). Resist layers tempered at 130 °C are basically non-developable anymore.

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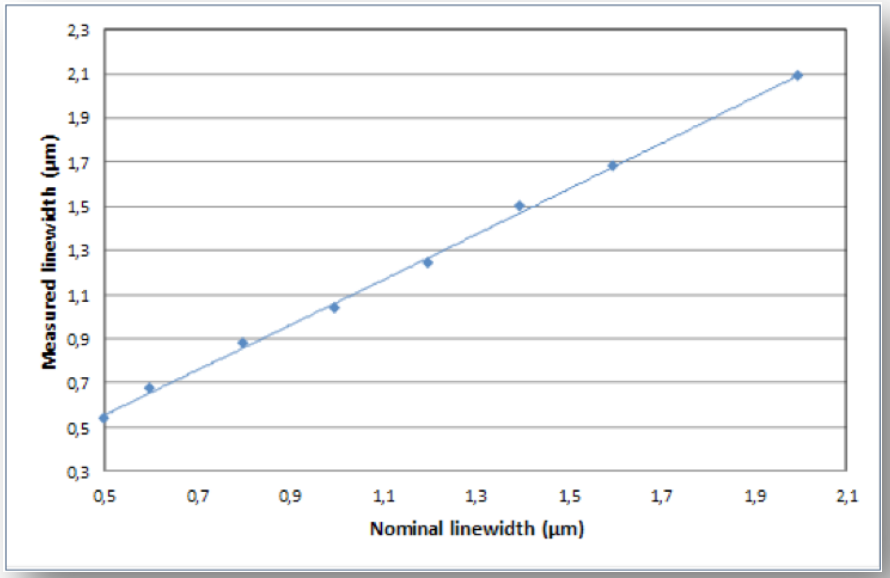
Sensitive photoresist for the production of sub-um semiconductor devices

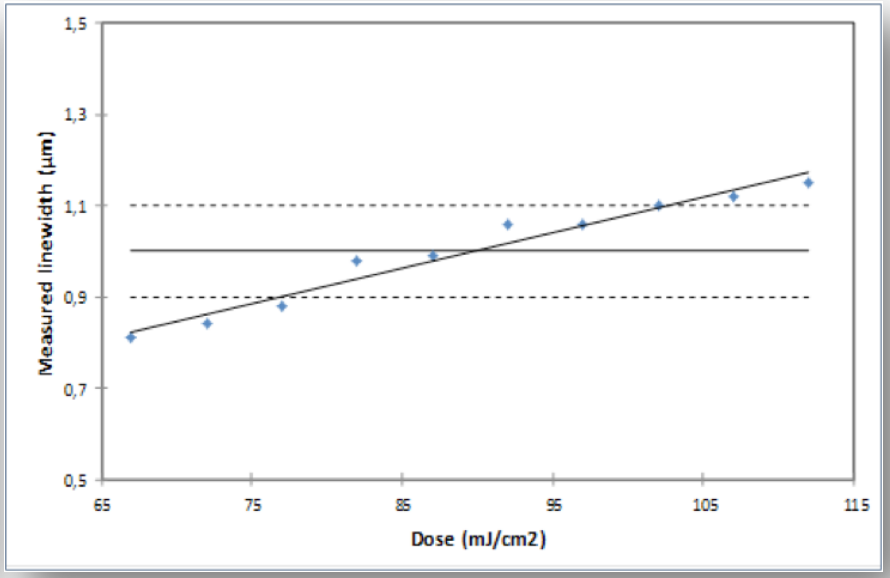
Reference data for process tuning

Linearity



Up to a structure width of 0.5, a very good agreement is obtained

Optimum exposure dose



The optimum exposure dose for 1 µm lines is 88 mJ/cm².

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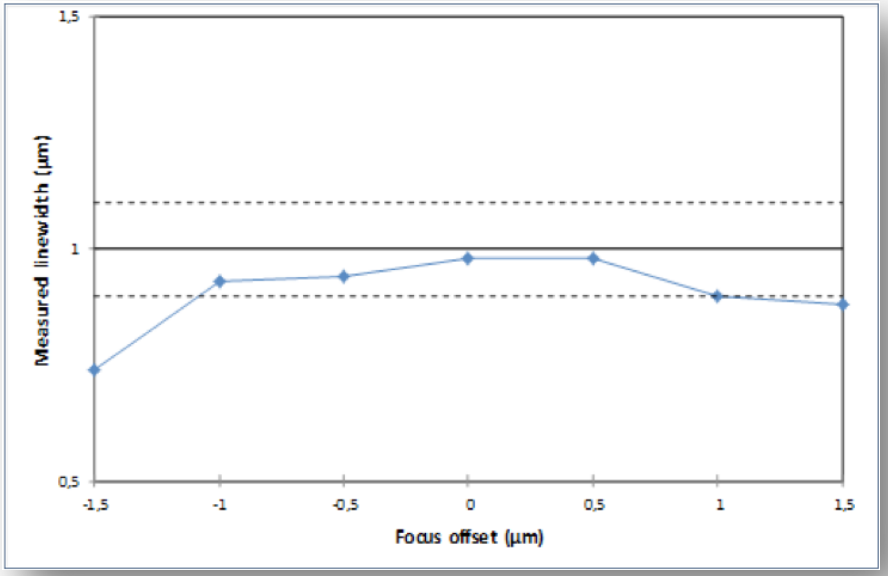
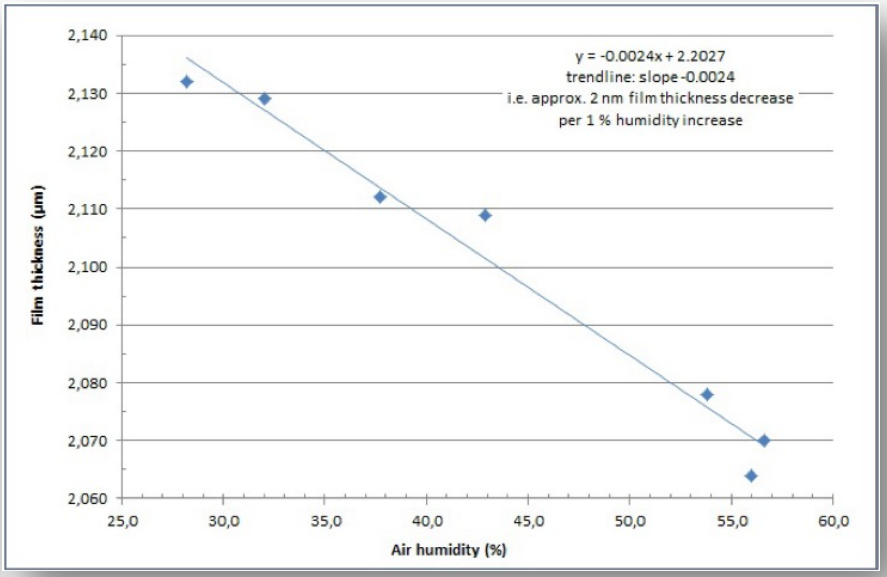
Focus variation



The intended structure sizes can be realized by varying the focus between -1.0 to 1.0.

Dependency of film thickness on air humidity



With increasing humidity, the resulting film thickness during coating of the resist decreases.

AR-P 3740 Standard Positive i-Line Photoresists

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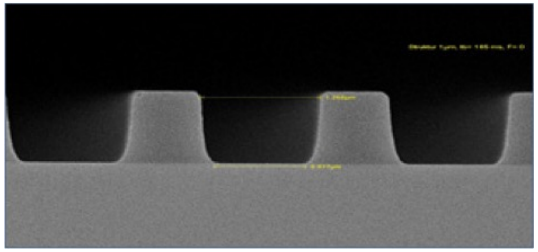
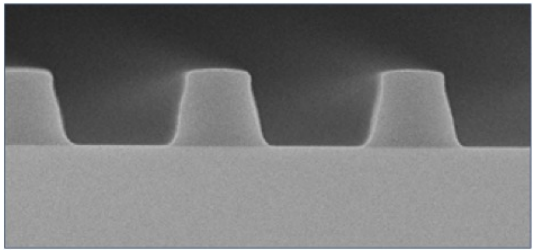
Reference data for process tuning

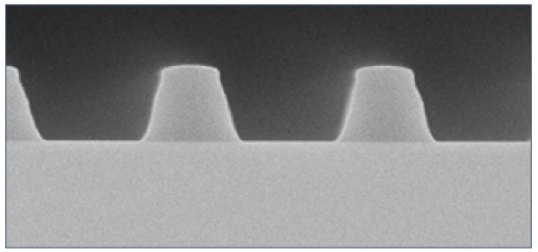
Thermal behavior of resist structures



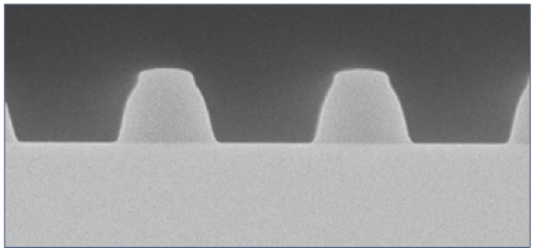
without hardbake



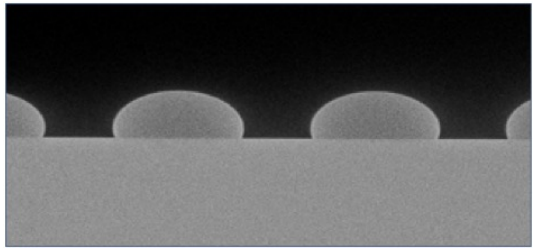
hard bake 110°C



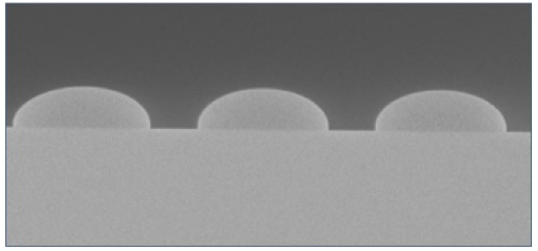
hard bake 120°C



hard bake 130°C



hard bake 140°C



hard bake 150°C