Chemically Amplified Negative Photoresist AR-N 4340

Highly sensitive negative resist for the production of integrated circuits

AR-N 4340 產品說明

AR-N 4340 為化學增幅型,高敏感度負型光阻,適合各類次微米(sub-um)電路運用。
產品基本資料如下：

		AR-N 4340
Film thickness@4000rpm	um	1.4
Viscosity 25°C	mPas	18
Resolution	um	0.5
Contrast		5.0
Flash point	°C	44
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。
（本產品目前暫無國內庫存)

AR-N 4340 GHS 標識

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Characterization 產品特性

- i-line, g-line
  曝光波長: i-line (365nm) , g-line (436nm)
- highest sensitivity, excellent resolution
  高敏感度,高解析度.
- good adhesion, high contrast, chemically enhanced
  化學增幅型,具高對比,與基板黏著度良好.
- undercut profiles (lift-off) are possible
  可調整成下切型圖案, 用於懸浮剝離製程.
- plasma etching resistant
  耐各類電漿蝕刻.
- temperature-stable up to 220 °C after subsequent treatment
  調整適合製程可使光阻在220°C高溫維持穩定.
- novolac with photochemical acid generator and amine-based crosslinking agent
  成份含酚醛樹酯,光酸與架橋劑.
- Safer solvent PGMEA
  使用較安全溶劑丙二醇單甲醚醋酸酯

NextStep
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ALLRESIST

Property I		
Parameter		AR-N 4340
Solids content	%	32
Viscosity@25°C	mPa.s	18
Film thickness@4000rpm	um	1.4
Resolution	um	0.5
Contrast		5.0
Flash point	°C	42
Storage 6 months	°C	10 - 18

Property II			
Glass trans. temperature	°C	102	
Dielectric constant		3.1	
Cauchy coefficients		unexposed	exposed
	N_0	1.593	1.599
	N_1	75.4	81.4
	N_2	80.0	81.4
Plasma etching rate 5 Pa, 240-250 V Bias	nm/min	Ar-sputtering	8
		O_2	173
		CF_4	33
		80 CF_4 +16 O_2	93

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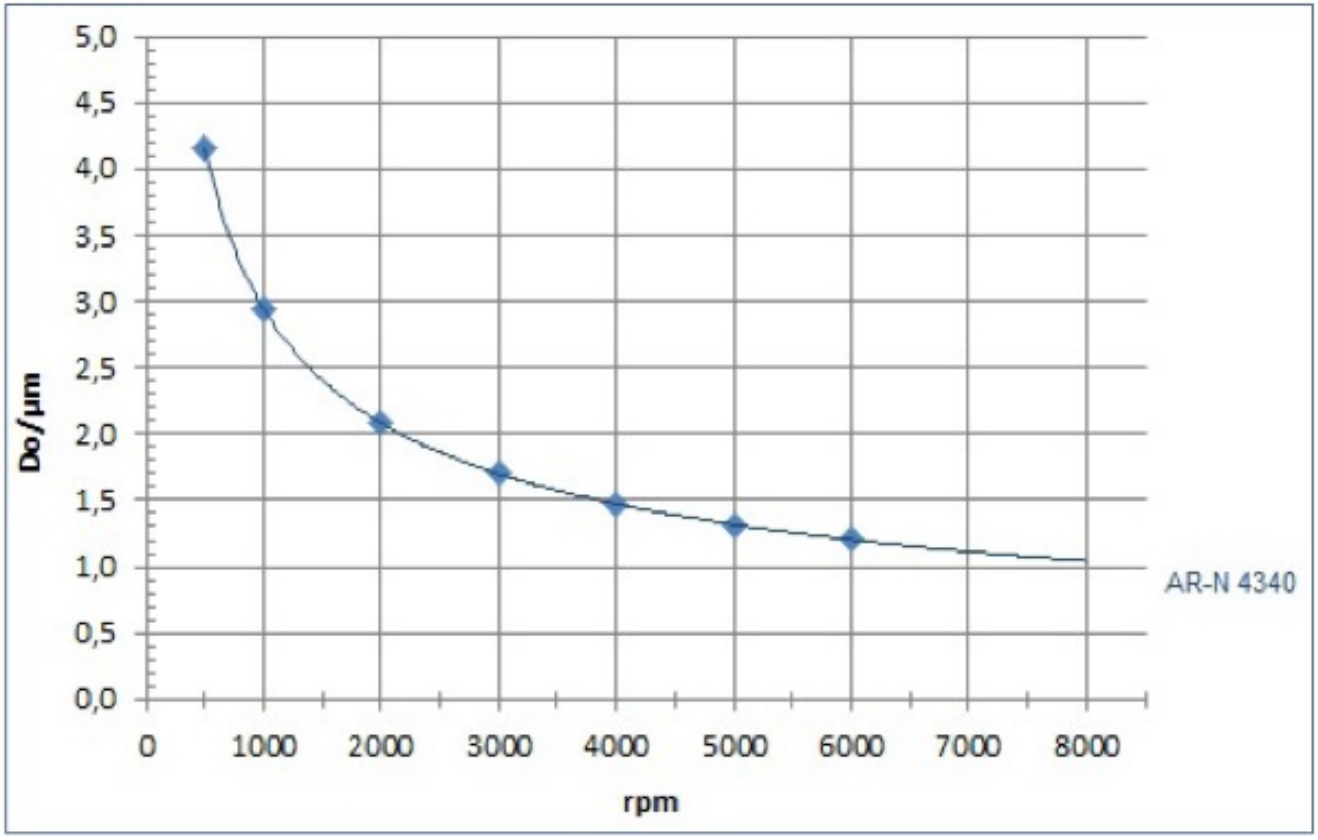
Spin curve of AR-N 4340



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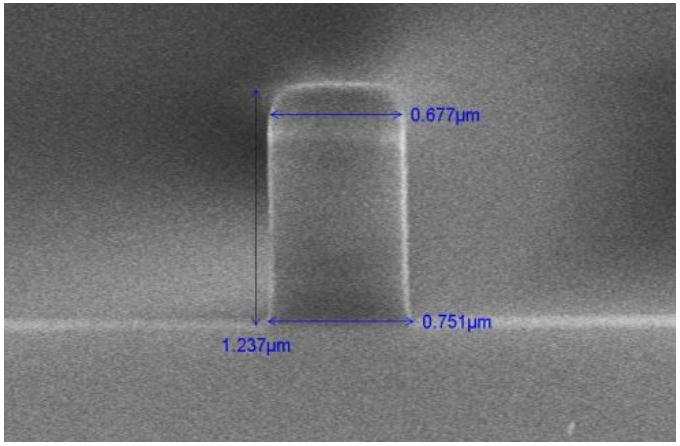
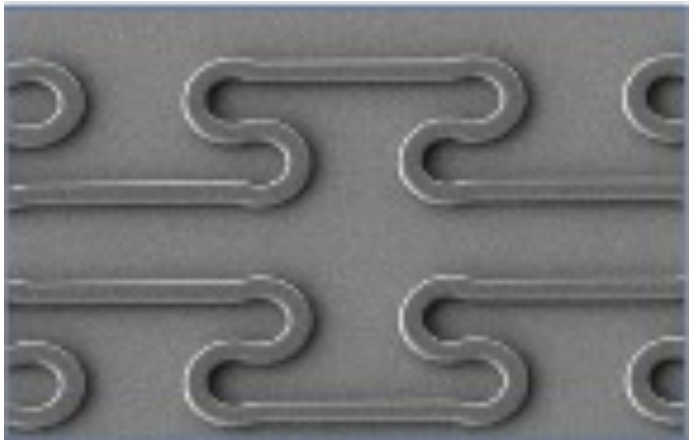
Structure resolution



AR-N 4340 Film thickness 1.4 µm Resist structure 0.7 µm L/S

Resist structures



AR-N 4340 Film thickness 2.0 µm Resist structure 4.0 µm

Process parameter

Substrate	Si 4” wafer
Soft-bake	85 °C x 60 sec, hot plate
Exposure	i-line stepper (NA: 0.65)
Development	AR 300-475 x 60 sec, 22 °C

Process chemicals

Adhesion promoter	AR 300-80
Developer	AR 300-475
Thinner	AR 300-12
Remover	AR 300-76, AR 300-72

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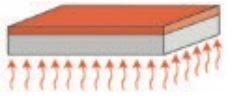
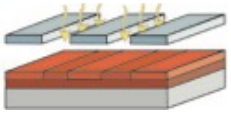
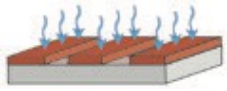
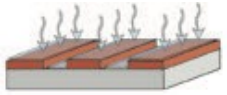
This diagram shows exemplary process steps for resist AR-N 4340. All specifications are guideline values which must be adapted to own specific conditions. For further information on processing, ? “Detailed instructions for optimum processing of photoresists”. For recommendations on wastewater treatment and general safety instructions, ? ”General product information on Allresist photoresists”.

圖示AR-N 4340產品製程參數的範例. 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-N 4340
	1.4 um@4000rpm x 60 sec
Soft bake (±1 °C) 	90°C x 1 min hot plate, or
	85°C x 25 min convection oven
UV exposure 	Broadband UV, 365nm, 405nm, 436nm
	Exposure dose (E_0 broadband UV stepper):140 mJ/cm²,1.4 μm
Cross-linking bake (±1°C) 	95°C x 2 min hot plate, or
	90°C x 25 min convection oven
Development (21-23±0.5°C) puddle 	AR 300-475, 60 sec
	Note: By extending the development time, an undercut (lift-off) of the resist structure can be obtained at minimum possible exposure dose
Rinse	DI water, 30 sec
Hardening of structures up to 300°C (optional)	Flood exposure 150 mJ/cm², bake 115°C, 1 min hot plate
Customer specific technology 	Generation of semiconductor property or lift-off
Removal 	AR 300-76 or O_2 plasma ashing

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Reference data for process tuning

TCD vs. bake temperature

Temperature °C	TCD (s)	Dose (mJ/cm²)
70	20	480
80	22	250
90	24	140
100	41	65
110	80	55
120	210	220
130	∞	∞

Development recommendations

Developer	AR 300-26	AR 300-26	AR 300-26
AR-N 4340	1 : 1	undilute	AR 300-475

Samples were dried at 85 °C and crosslinked at temperatures as indicated (developer: AR 300-475). The development strongly depends on the bake temperature.

Above a temperature of 130 °C, resist AR-N 4340 is not developable anymore. Optimum temperatures range between 90 and 100 °C.

樣品條件: 軟烤 85°C, 以表列溫度進行曝後考.

顯影劑: AR 300-475

顯影時間與曝後烤溫度有直接關係.

曝後烤溫度達130°C, 光阻就無法被顯開.

最適合曝後烤溫度介於90°C至100°C.

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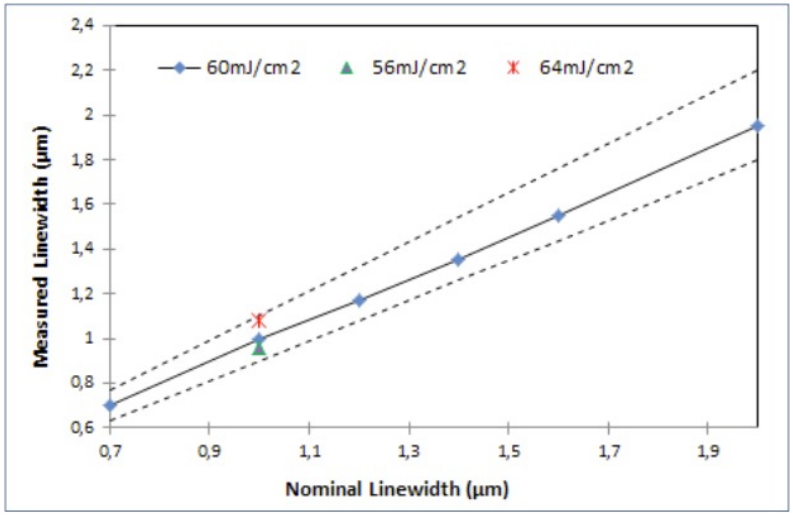
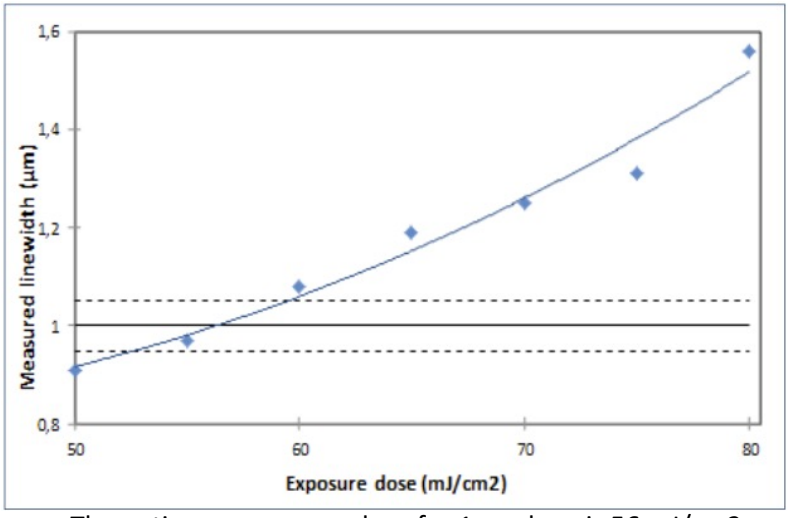
Linearity



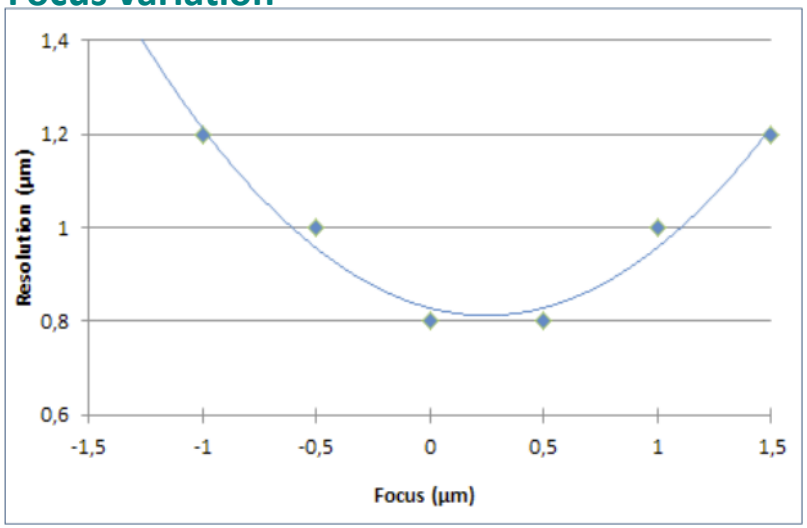
Up to a line width of 0.7 µm, the linearity is in the desired range (parameter see grafic Focus variation)

Optimum exposure dose



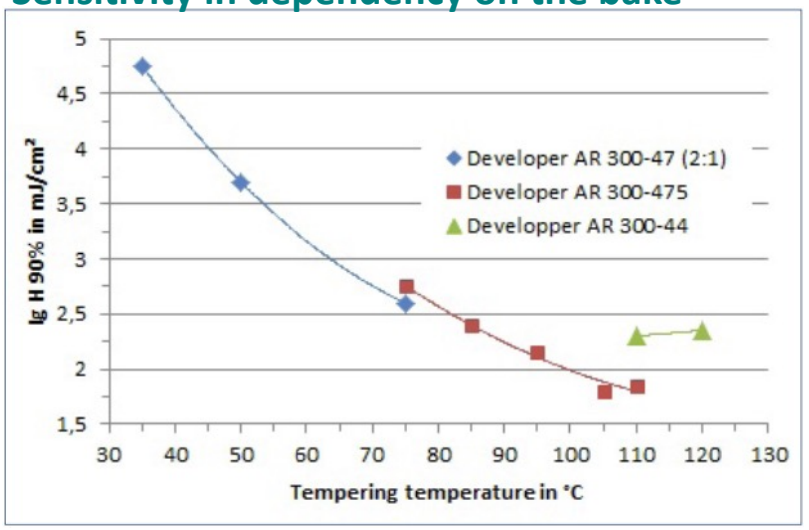
The optimum exposure dose for 1 µm-bars is 56 mJ/cm2 (parameter see grafic Focus variation)

Focus variation



The resist achieves a resolution of 0.8 µm optimal focus adjustment REM measurement: Thickness 1,5 µm, PEB 105 °C, 180 s, I-line stepper (NA: 0,65), Developer AR 300-475.

Sensitivity in dependency on the bake



Samples were both dried and crosslinked at temperatures as indicated. The optimum working range is between 90 and 110 °C.

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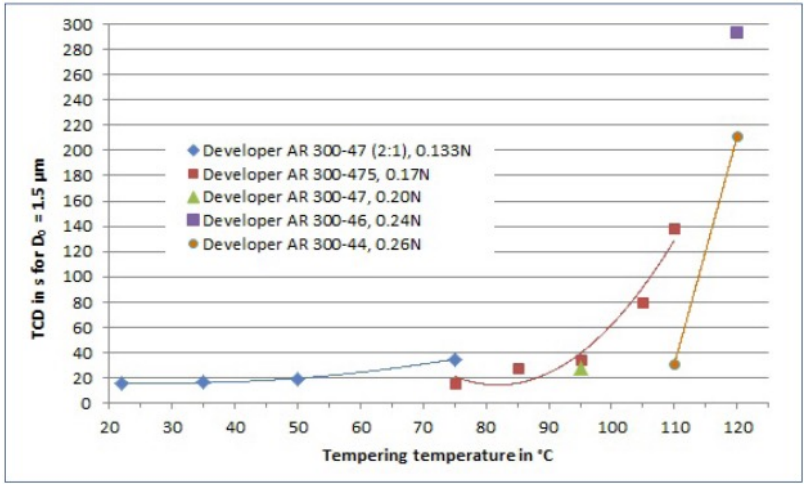
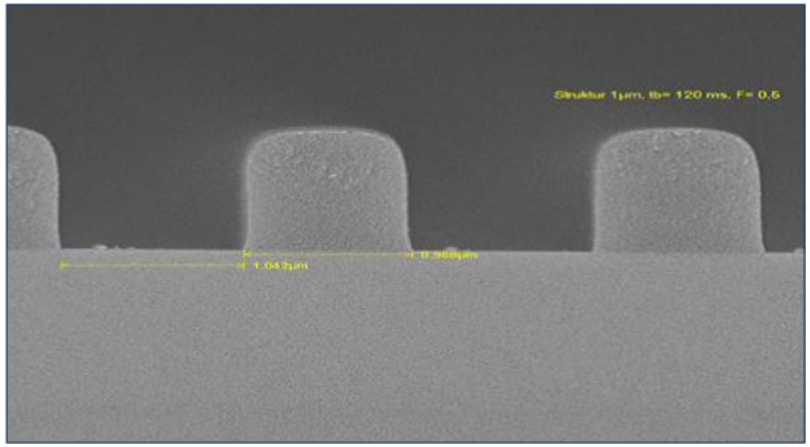
Time for complete development vs. bake



The time for complete development is very short at bake temperatures of < 50 °C, even if weak developers are used. With increasing temperature, the time for complete development (TCD) is considerably prolonged. Above a temperature of 120 °C, complete development of the resist is no longer possible.

Temperature stability after hardening



Hardened resist bar structures after tempering at 200 °C

The developed structures are stable between 140 -160 °C, depending on the drying procedure (hot plate or oven). Structures can be stabilized up to temperatures of 220 °C by flood exposure and a subsequent bake at 120 °C.

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