

AR-P 3200 series 產品說明

AR-P 3200 系列，產品為正型厚膜光阻，黃光圖案尺寸精確，邊緣垂直度高，適合電鍍與微機電系統製程。

目前產品依配方與厚度範圍有如下序號：

		AR-P 3210	AR-P 3220	AR-P 3250	AR-P 3250T
Film thickness@4000rpm	um	10	10	5	5
Resolution	um	4.0	3.0	1.2	1.2
Contrast		2.0	3.0	2.5	2.5
Flash point	°C	46	46	44	44
Storage 6 months★ ¹	°C	10 - 18			
Production status★ ²		on-demand	on-demand	routine	on-demand
GHS label		 GHS 標識	 GHS 標識	 GHS 標識	 GHS 標識

★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。(AR-P 3250)

其它序號無固定生產排程，需先詢問。

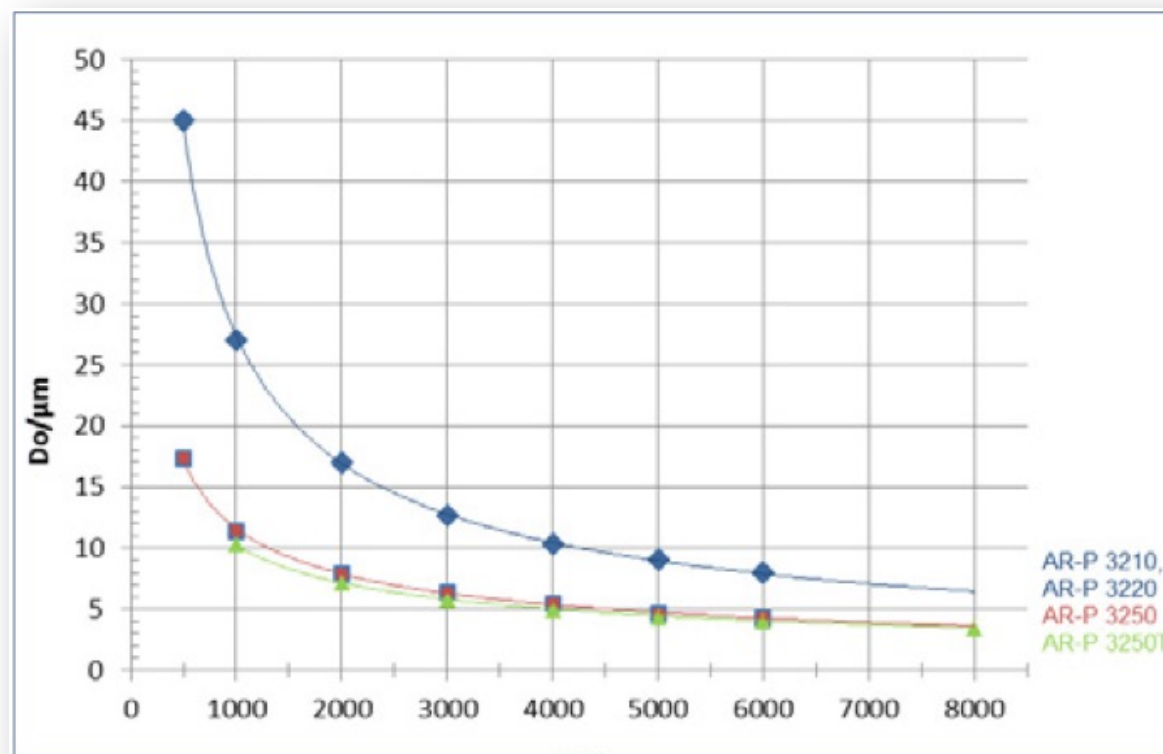
Characterization 產品特性

- broadband UV, i-line, g-line
曝光波長: 寬頻紫外線, i-line (365nm) , g-line (436nm)
- high photosensitivity, high resolution
高敏感度, 高解析度
- profiles with high edge steepness dimension accuracy.
黃光圖案尺寸精確, 邊緣垂直度高
- plasma etch resistant, electroplating-stable
耐電漿蝕刻. 電鍍製程穩定
- AR-P 3210 film thickness up to 40um/AR-P 3250 film thicknesses up to 20 μm
AR-P 3210 膜厚最高可達 40um/AR-P 3250膜厚最高可達20um
- AR-P 3220 transparent for thick films up to 100 μm in multiple coating steps, 100 μm development in one step
AR-P 3220 透明膜厚經多次疊加塗佈可達100um, 僅需單次顯影.
- combination of novolac and naphthoquinone diazide
主要成份為酚醛樹脂及疊氮基萘醌
- safer solvent PGMEA
使用較安全溶劑丙二醇單甲醚醋酸酯

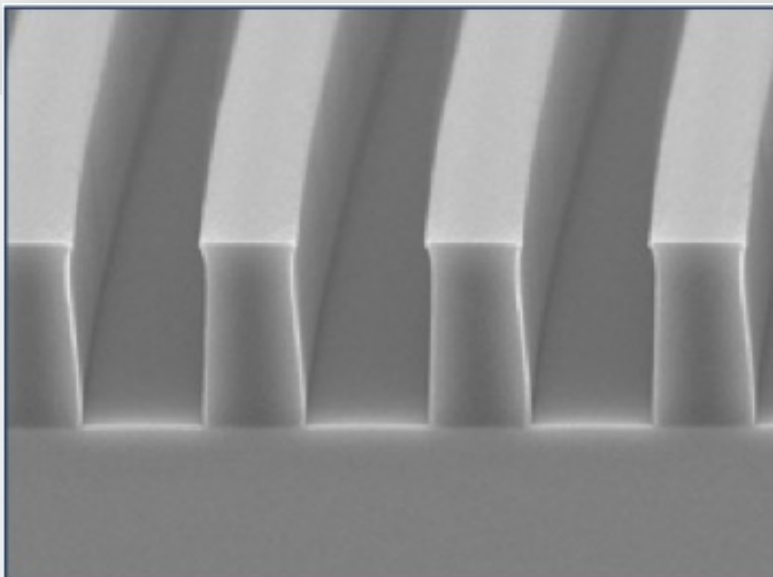
Property I					
Parameter		AR-P 3210	AR-P 3220	AR-P 3250	AR-P 3250T
Solids content	%	47	47	39	39
Viscosity@25°C	mPa.s	1990	1820	250	250
Film thickness@4000rpm	um	10	10	5	5
Resolution	um	4.0	3.0	1.2	1.2
Contrast		2.0	2.0	2.5	2.5
Flash point	°C	46	46	44	44
Storage 6 months	°C	10 - 18			

Property II				
Glass trans. temperature	°C	108		
Dielectric constant		3.1		
Cauchy coefficients (AR-P 3210)	N ₀	1.597		
	N ₁	79.5		
	N ₂	105.1		
Plasma etching rate 5 Pa, 240-250 V Bias	nm/min	Ar-sputtering	7	
		O ₂	170	
		CF ₄	39	
		80 CF ₄ +16 O ₂	90	

AR-P 3200series Spin curve

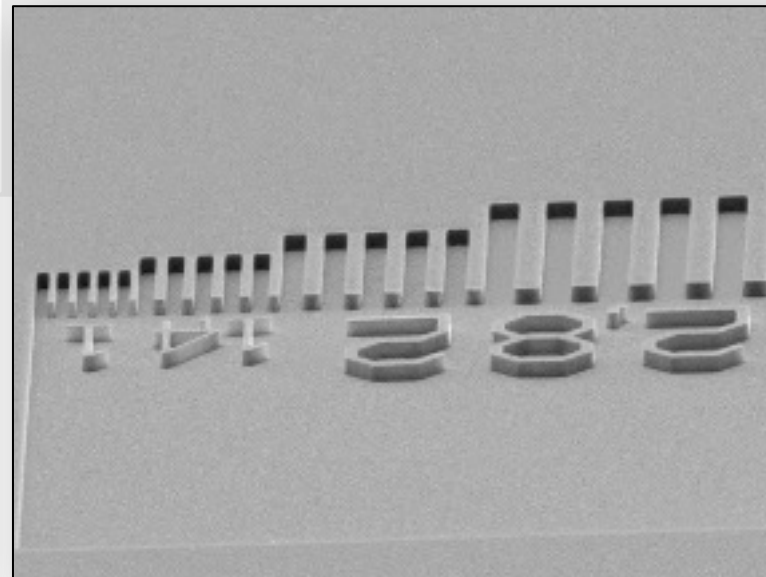


Structure resolution



AR-P 3210 Film thickness 12 μm Resist structures 4 μm

Resist structures



AR-P 3220 Film thickness 25 μm

Process parameter

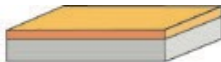
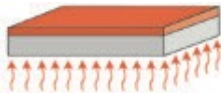
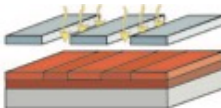
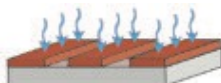
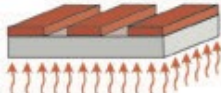
Substrate	Si 4" wafer
Soft-bake	95 °C x 10-15min, hot plate
Exposure	aligner MJB 3, contact exposure
Development	AR 300-26,1:3, 3 min ,22°C

Process chemicals

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

This diagram shows exemplary process steps for AR-P 3200 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 3200系列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-P 3210 10 um 4000rpm x 90 sec	AR-P 3220 30 um 4000rpm x 120 sec	AR-P 3250 5 um 4000rpm x 60 sec	AR-P 3250T 5 um 4000rpm x 60 sec
Soft bake (± 1 °C) H*: hot plate C*: convection oven		H* 95°C x 4 min C* 90°C x 40 min	95°C x 15 min 90°C x 90 min	95°C x 2 min 90°C x 30 min	95°C x 2 min 90°C x 30 min
UV exposure		Broadband UV, 365nm, 405nm, 436nm/Dose (E0, stepper)			
		450 mJ/cm ²	900 mJ/cm ²	220 mJ/cm ²	300 mJ/cm ²
Development (21-23 $\pm$ 0.5°C) puddle		AR 300-26 (1 : 2) 2 min	AR 300-26 (pure) 3 min	AR 300-26 (3 : 2) 2 min	AR 300-44 (pure) 2 min
Rinse		DI water, 30 sec			
Post-bake (optional)		Not required			
Customer specific technology		Generation of semiconductor properties, galvanic, MEMS			
Removal		AR 300-76 or O2 plasma ashing			

Reference data for process tuning

Processing instructions (for the processing of thick films > 40 µm)

Coating: Coating should be performed in two or several steps using the same procedure. After a low initial spin speed (30 s), a main spin speed of 250 – 500 rpm for at least 2-5 min should be chosen. A brief subsequent spinning off at 600 – 800 rpm for 5 s reduces edge bead formation.

塗佈: 建議採用兩次或多次同參數的累加塗佈. 先以30秒低轉速讓光阻分佈於基板,隨後主轉速250 - 500轉約2 - 5分鐘. 最後提高轉速至600-800轉約5秒以減少邊緣隆起形成.

Tempering: Tempering should be performed in 2 steps: 1. 75 °C, 5 min hot plate or 70 °C, 30 min convection oven; 2. 90 °C, 20 min hot plate or 90 °C, 80 min convection oven. After tempering, a slow cooling is recommended to avoid stress cracks.

軟烤: 建議兩階段軟烤以乾燥厚膜光阻; 1. 75°C x 5min 熱板,或 70°C x 30 min對流烤箱. 2. 90°C x 20 min 熱板或 90°C x 80 min對流烤箱. 冷卻應緩慢降溫以避免應力造成裂痕.

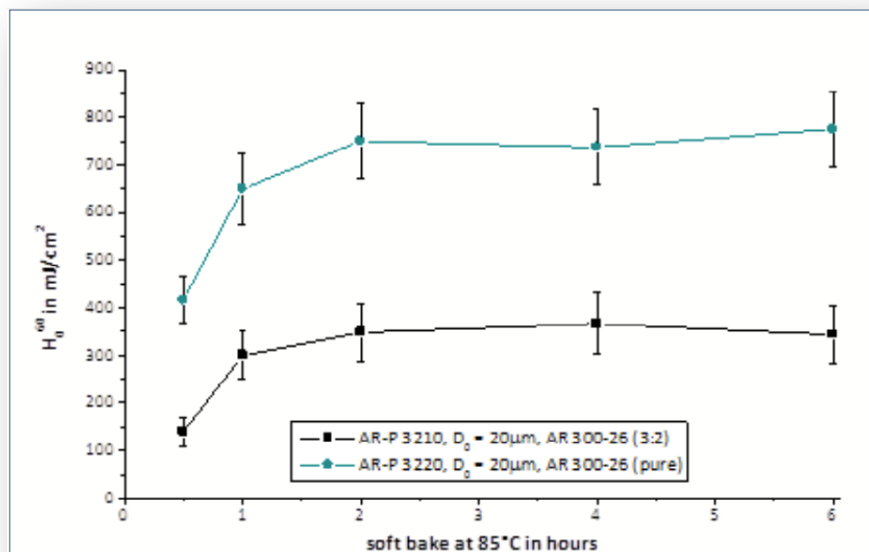
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Development recommendations

Resist	Developer		
	AR 300-26	AR 300-35	AR 300-44
AR-P 3210 (up to 20 µm)	1 : 2 to 1 : 3 (2 - 10 min)	pure up to 10 µm (2 - 10min)	--
AR-P 3220 (up to 20 µm)	3 : 1 to 2 : 1 (2 - 5 min)	--	--
AR-P 3250 (up to 10 µm)	2 : 1 to 3 : 2 (1 - 5 min)	--	--
AR-P 3250T (up to 5 µm)	--	--	Pure up to 5 µm (1 – 5 min)

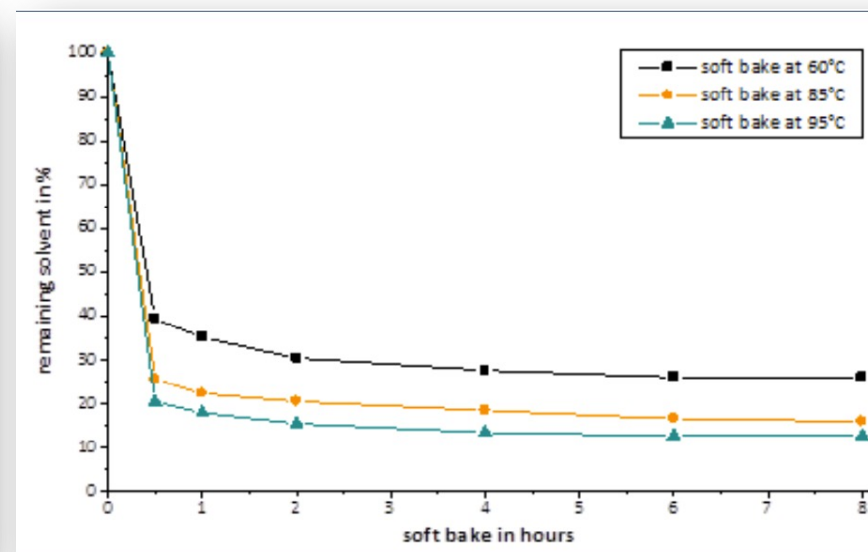
Reference data for process tuning

Sensitivity vs. duration of the soft bake



After 2 hours, the sensitivity remains more or less constant (broadband UV, resist thickness 20 μm).

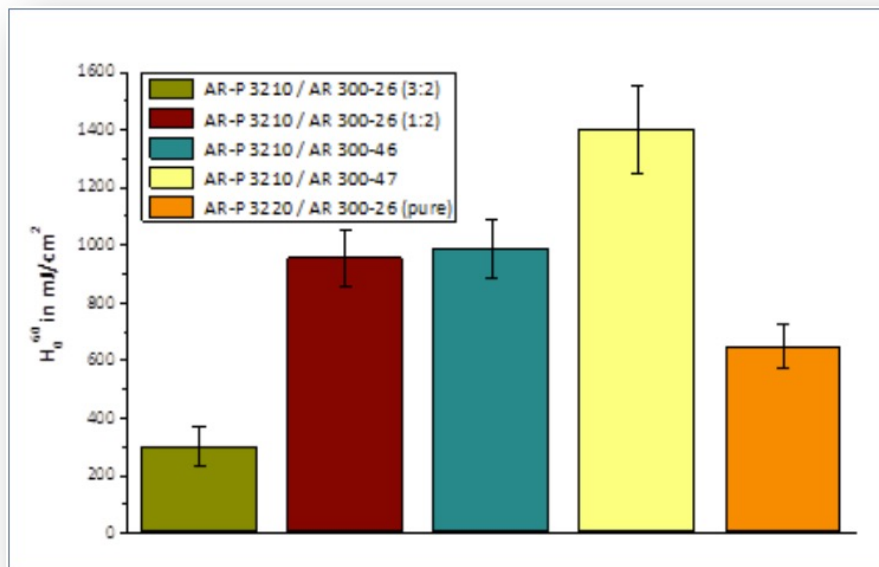
Residual solvent after tempering



After a bake at 95 °C, approx. 7 % of the solvent remain in the layer (initial solids content: 47 %)

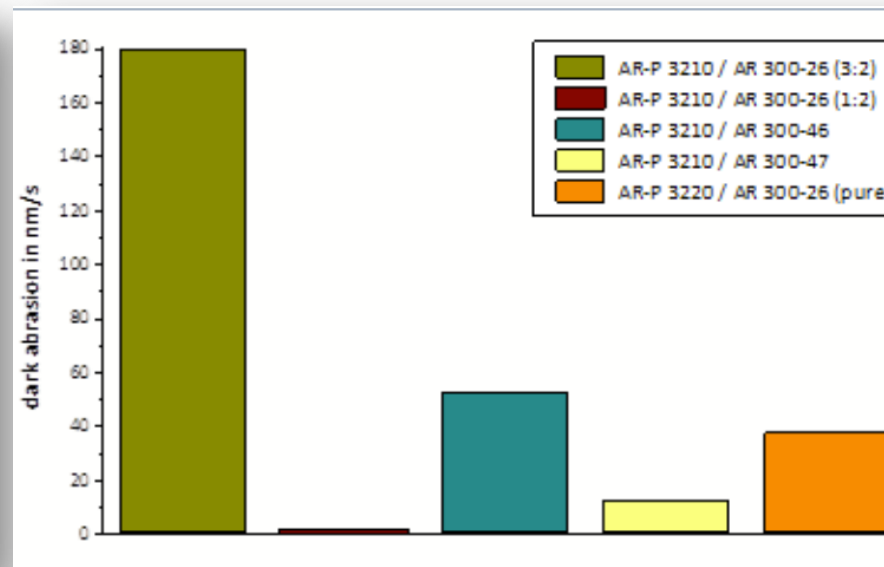
Reference data for process tuning

Sensitivity in different developers



Film thickness 20 µm, soft bake 85 °C, 1 h convection oven, broadband UV).

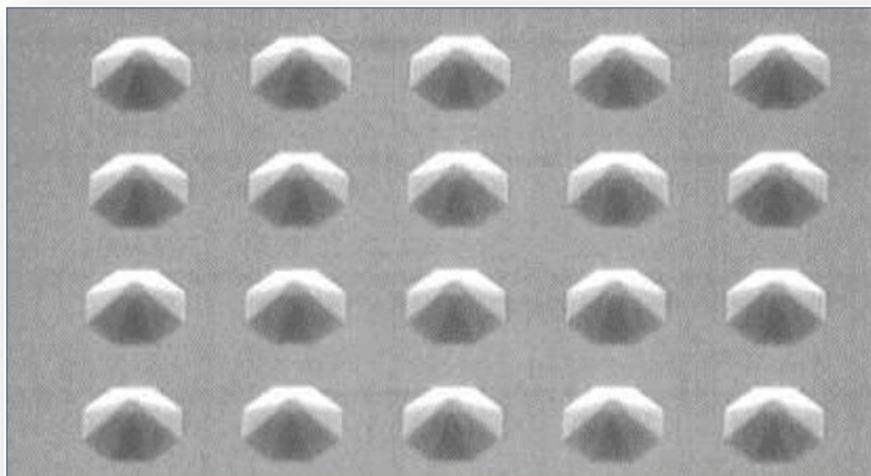
Dark erosion in different developers



Erosion corresponding to determined sensitivities

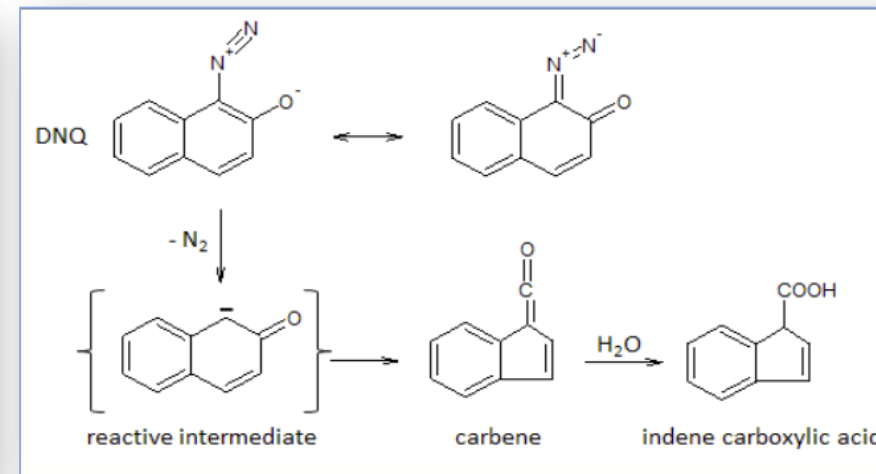
Reference data for process tuning

Grey tone mask lithography



28 μm-high 3 D pyramids with AR-P 3220

Photolysis of photo-active compound (PAC)



Chemical reaction for bleaching and full exposure of the layer (Süss- reaction)

The transparency of AR-P 3220 is higher as compared to AR-P 3210, due to the lower concentration of the PAC. The gradation is accordingly relatively low. This fact can be used for the fabrication of three-dimensional structures using grey tone masks with AR-3220. Different exposure doses will result in different resist film thicknesses.