

Single Layer 5% 495K MW PMMA in Chlorobenzene

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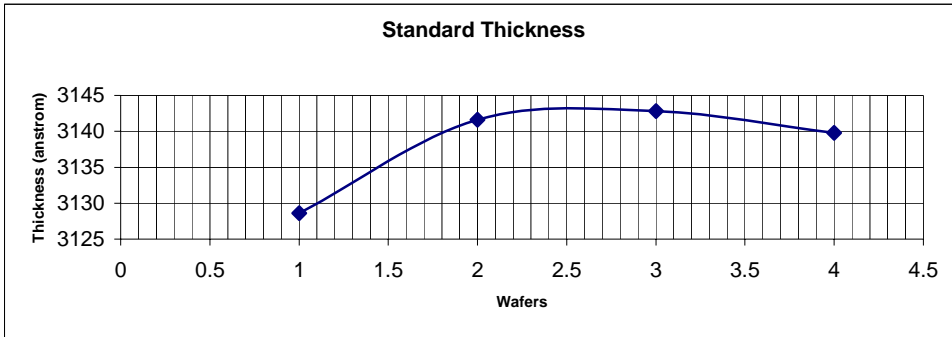
PMMA is an ultra-high resolution, high contrast positive resist used for nano-lithography. It has poor sensitivity and poor dry etch resistance. However it sticks well to almost any surface, lasts nearly forever and is not white light sensitive. This process will give you very reproducible results.

Material: Nanochem Resist: 5% 495K MW PMMA, 5% in chlorobenzene

1. **Singe Bake 150°C for 30 minutes**
 2. **Spin:** 3800 rpm for 30 seconds
Thickness = .31 -.34 μm , HMDS normally is not needed for Silicon substrates.
 3. **Post Apply Bake (PAB):**
A: 2 hours at 170°C. Use the big Blue-M oven and program #1.
B. 2 minutes at 200° C. on the Hotplate.
 4. **Exposure:** Hitachi H-700 @ 30 KeV:
Area doses range from 300 μC - 600 $\mu\text{C}/\text{cm}^2$ @ 30 KV.
Dose 550 –600 $\mu\text{C}/\text{cm}^2$ optimal for small lines and spaces on Si.
RAITH 150 @ 10 KeV: 150 – 200 $\mu\text{C}/\text{cm}^2$ for areas, 800 $\mu\text{C}/\text{cm}^2$ for lines on Si.
 5. **Develop:** 1:3 MIBK:IPA at 22°C, 30 – 40 Seconds. Rate is about 400 nm/minute.
Develop 1:3 MIBK:IPA for 30 seconds at 20 – 21 C is standard. Temperature control is recommended. Note: Dilutions of 1:1 and 1:2 have been used but with lower dose requirements, but 1:3 will result in the highest resolution and contrast.
 6. **Rinse** to STOP development in IPA for 15 - 30 seconds.
 7. **Inspect** in Optical Microscope, and SEM if CD measurements are required.
 8. **O2 Plasma Descum**, if desired using low power density for less than 1 minute.
 9. **Post Process:** Deposit Metal / Perform RIE etching to process result desired.
 10. **Strip:** 20 minutes in NMP @ 80°C, or O2 ash, ACE/IPA, or PRS-1000 Stripper.
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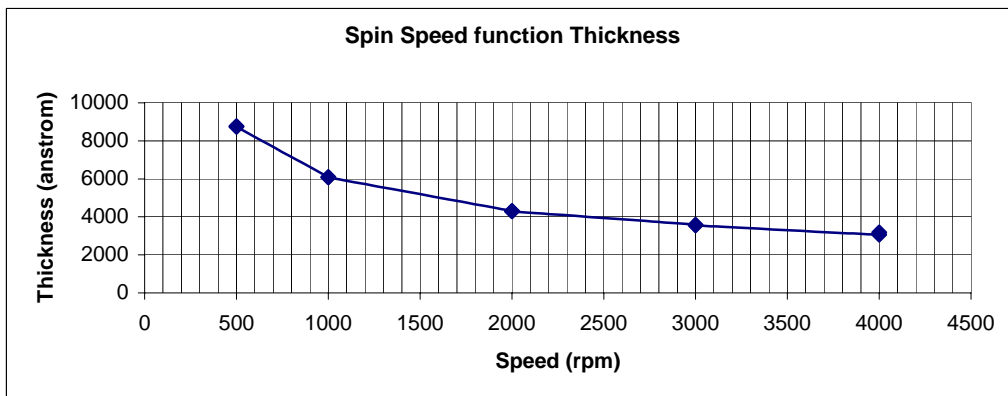
PMMA 495 MW 5%

Wafers	RPM	C	T	B	R	L	X	S	% VAR +-
1	3400	3134	3132	3121	3125	3131	3128.6	5.412947	0.35
2	3400	3156	3107	3143	3151	3151	3141.6	19.89472	1.26
3	3400	3149	3145	3146	3116	3158	3142.8	15.83351	1.00
4	3400	3148	3153	3146	3117	3135	3139.8	14.34225	0.91



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Wafers	RPM	C	T	B	R	L	X	STDDEV	% VAR +-
A1	500	8637	8796	8832	8733	8880	8775.6	94.23534	2.12
A2	500	8562	8860	8751	8706	8803	8736.4	113.2091	2.56
A3	1000	6085	6084	6082	6073	6126	6090	20.67607	0.68
A4	1000	6052	6043	6105	6039	6126	6073	39.78065	1.30
A5	2000	4303	4259	4389	4308	4298	4311.4	47.51105	2.18
A6	2000	4298	4189	4330	4301	4324	4288.4	57.29136	2.64
A7	3000	3630	3560	3611	3573	3561	3587	31.72538	1.75
A8	3000	3612	3519	3528	3573	3497	3545.8	46.20281	2.57
A9	4000	3047	3138	3040	3104	3021	3070	49.0153	3.14
A10	4000	3078	3148	3227	3374	3063	3178	127.4186	7.71



Spin Speed (f) Thickness
495K MW STD. PMMA

