

UV Cure Characterization for Ion Implantation

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Last updated: 12/10/09

UV bake processes have been developed to allow resist to withstand ion implantations that use high energy and/or high beam current. All UV cure recipes were tested to withstand 170 uA, 100 keV implantations of $1e15$ As.

Three i-line photoresists have been characterized. Two are used with the contact aligner (SPR 220-3.0 and STR1813), while one is used with the 5X Autostep (AS200). The table below lists the spin speeds and bake procedures that are used in the steps: spin, softbake, expose, post-exposure bake (in some cases), develop, UV bake. The photoresists can be removed following ion implantation with 40 minutes in the photoresist hot strip baths. Bathing in acetone overnight does not remove the photoresist.

Photoresist	PR Spin Speed	Softbake	Post exposure bake (PEB)	Exposure	Thickness
SPR 220-3.0	(4000 rpm, 1000 rpm/s, 30 s)	90 s @ 115 C	90 s @ 115 C	102 mJ/cm ² (ABM)	1.2 um
STR 1813	(3000 rpm, 1000 rpm/s, 30 s)	60 s @ 115 C		150 mJ/cm ² (ABM)	1.46 um
SPR 955-0.9	(3000 rpm, 1000 rpm/s, 30 s)	90 s @ 90 C	90 s @ 115 C	0.19 s exposure on AS 200	0.7872 um

UV Bake Recipes

Standard

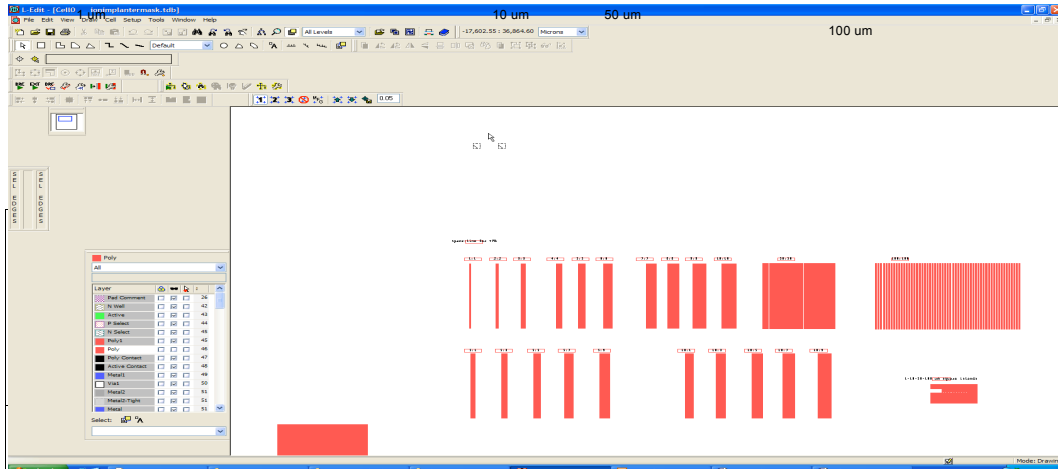
Temp	Time (s)	Step	Lamp	Time
Softbake		IDLE		
HOLD	5	1	LOW	5
Tfinal	Time_r	2	HIGH	Time_r

Single Flash

Temp	Time (s)	Step	Lamp	Time
Softbake		IDLE		
HOLD	17	1	FLASH	2.0
Tfinal	Time_r	2	OFF	10
		3	LOW	5
		4	HIGH	Time_r

STR1813 -

Contact Aligner (ABM/EV 620) Mask File

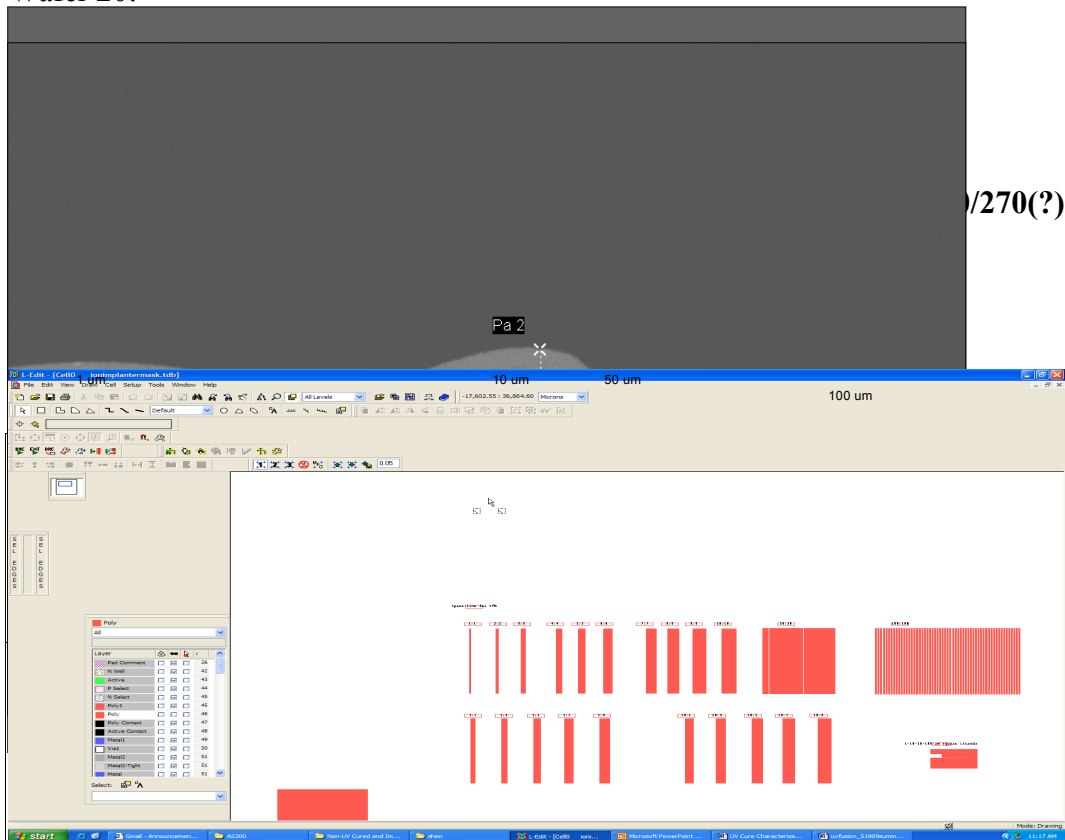


8	115	85	200	0.6674	1.326
10	115	95	210	0.5993	1.421
12	125	75	190	1.725	1.448
14	125	85	200	1.355	1.199
16	125	95	210	2.572	1.456
18	105	75	190	0.7095	1.453
20	105	85	200	1.845	1.609
22	105	95	210	1.034	1.62

Wafer 18 (SB = 105 C, Ramp = 75 s, $T_{final} = 190$ C):



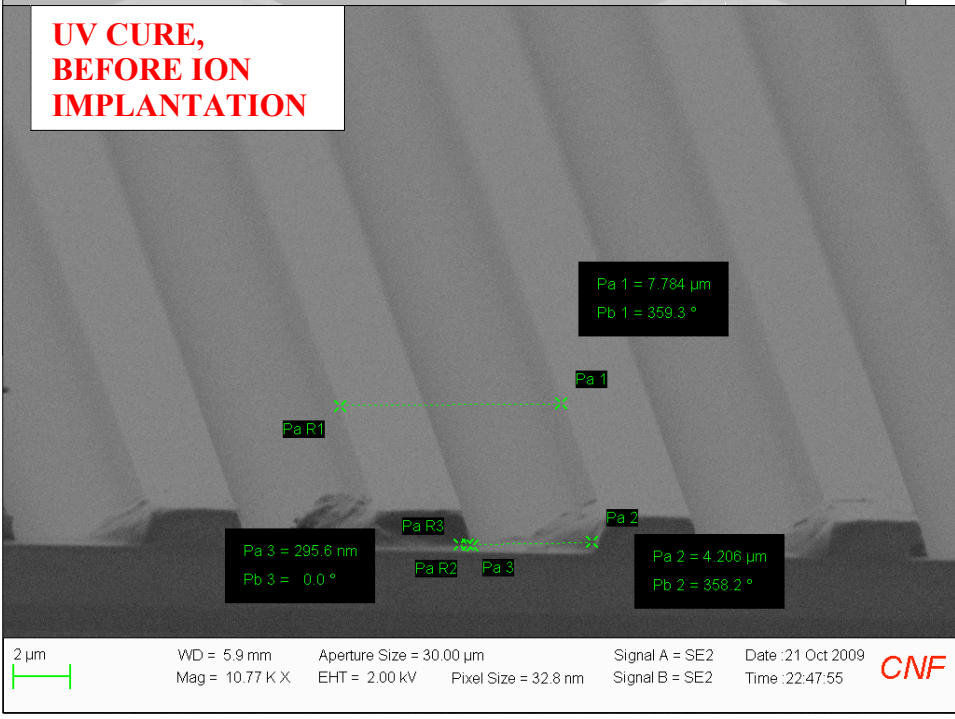
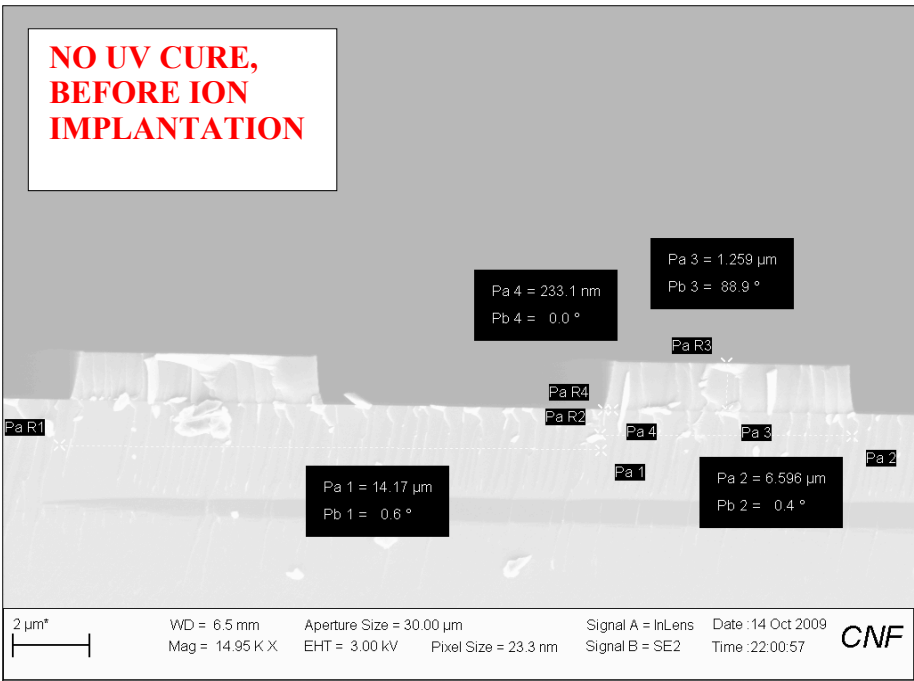
Wafer 20:

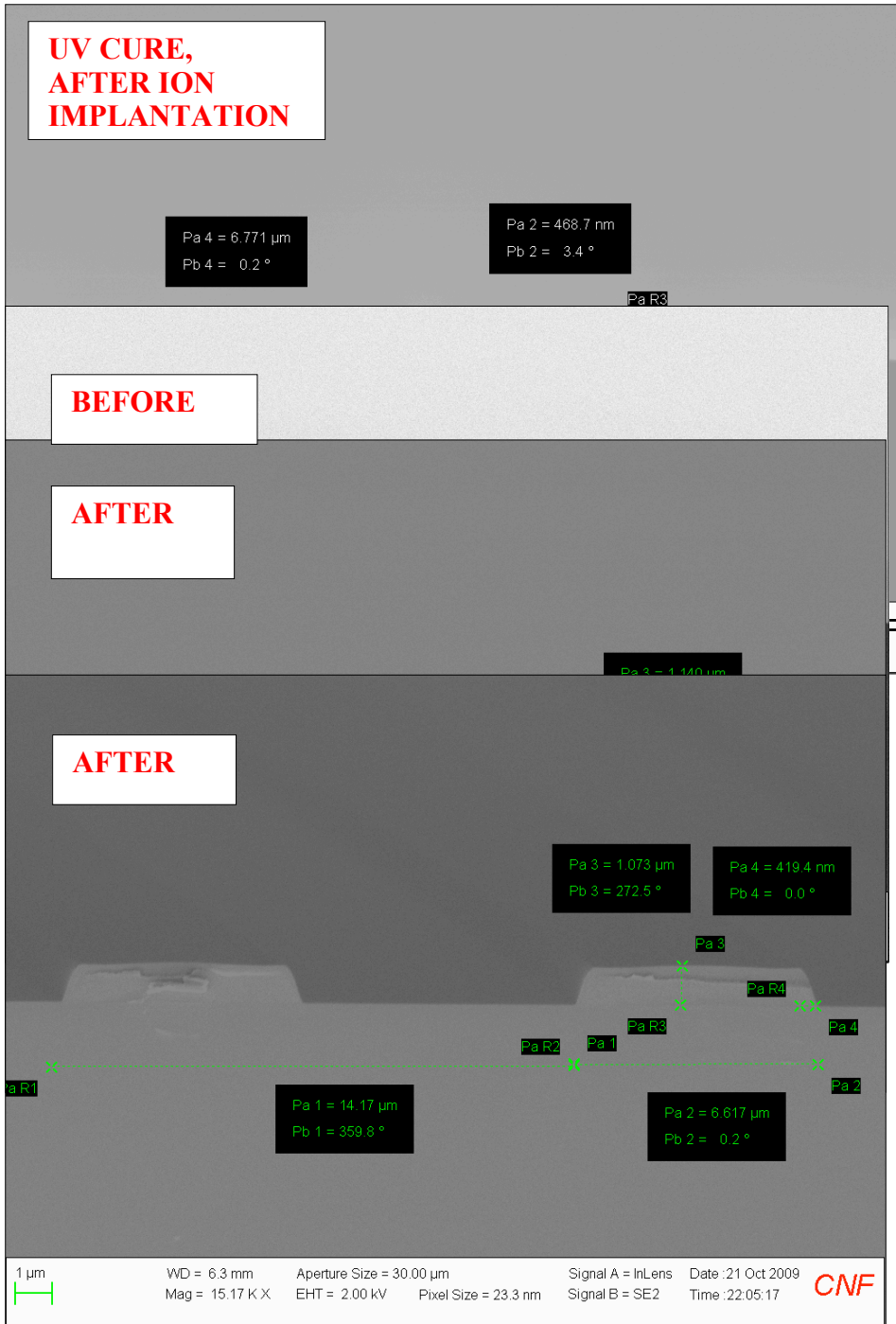


/270(?)

4	115	260	190	See data (*)	
4-implanted	115	260	190	See data (*)	
5	115	270	200	0.477	1.264
5-implanted	115	270	200	0.506	1.140
6	115	280	210	See data (*)	
6-implanted	115	280	210	See data (*)	
7	95	260	190	See data (*)	
7-implanted	95	260	190	See data (*)	
8	95	270	200	See data (*)	
8-implanted	95	270	200	See data (*)	
9	95	280	210	0.419	1.073
9-implanted	95	280	210	0.419	1.073
10	No uv cure			0.233	1.259
10-implanted	No uv cure			ROUND	ROUND

Wafer 10 before and after Ion Implantation: NO UV CURE





SPR 955-0.9

**UV Cure Recipe: Standard with softbake = 90 C, Time_r = 55 seconds to 200 C
Tfinal temperature**

