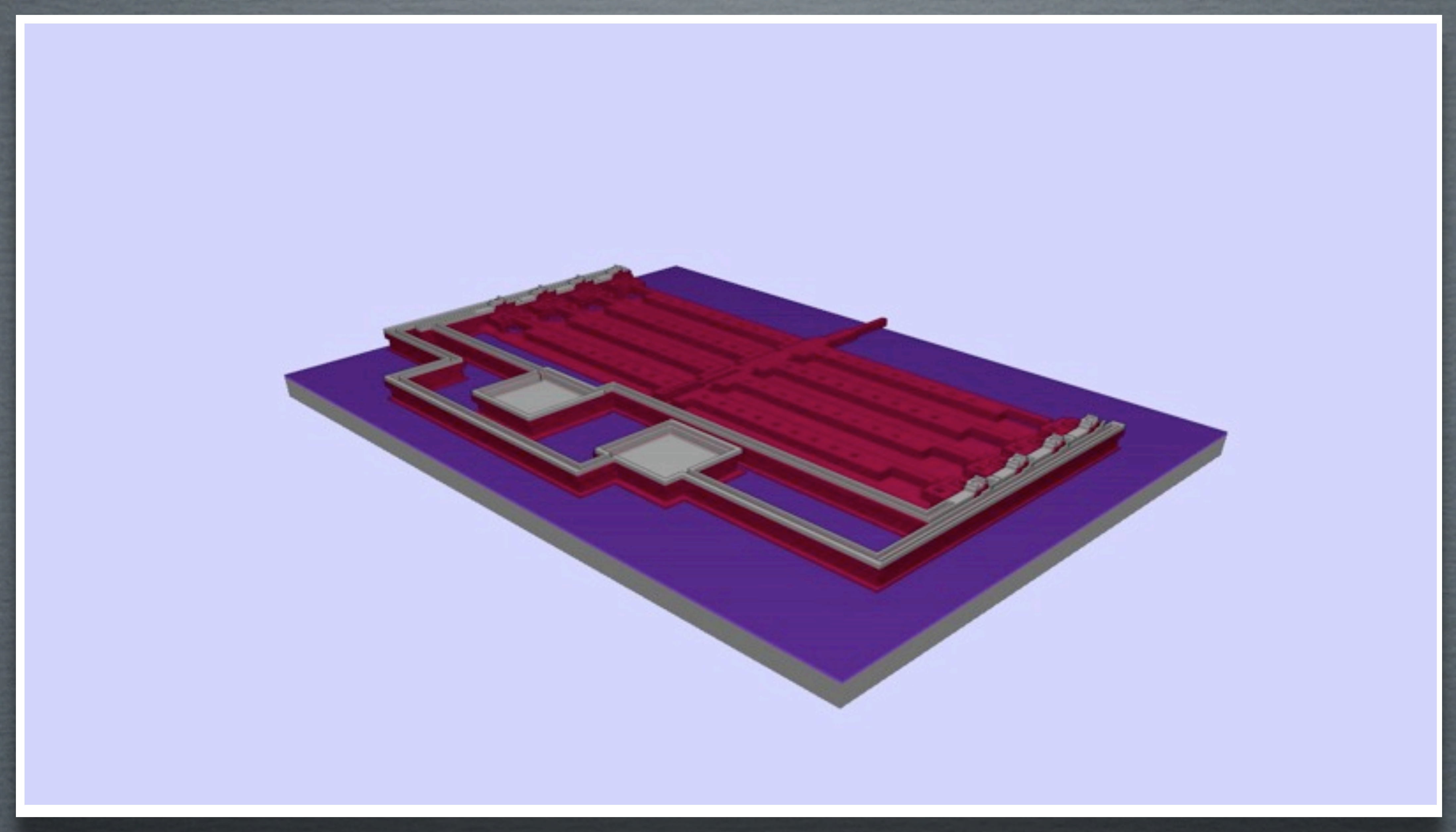
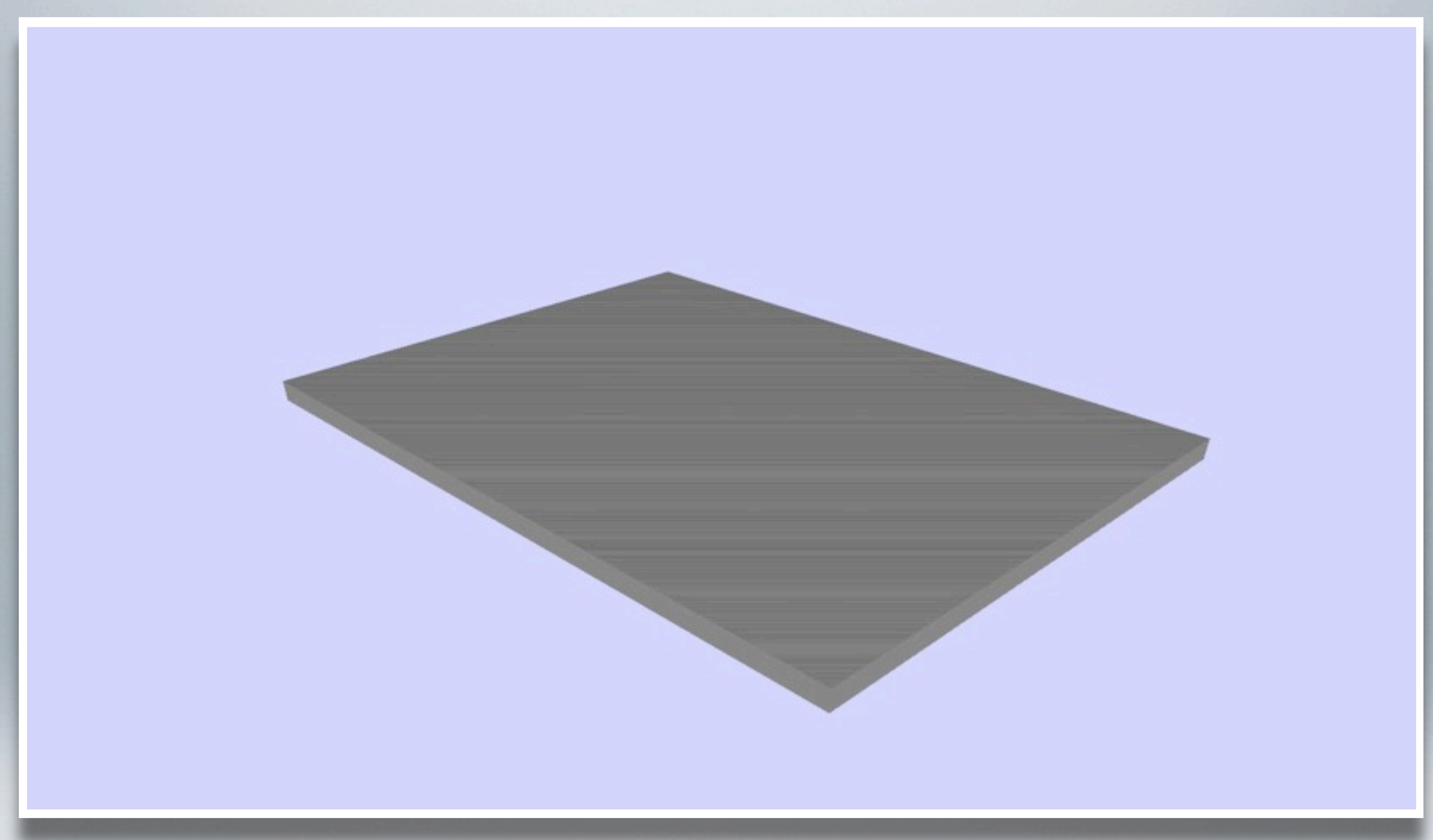


Electrothermal Actuator

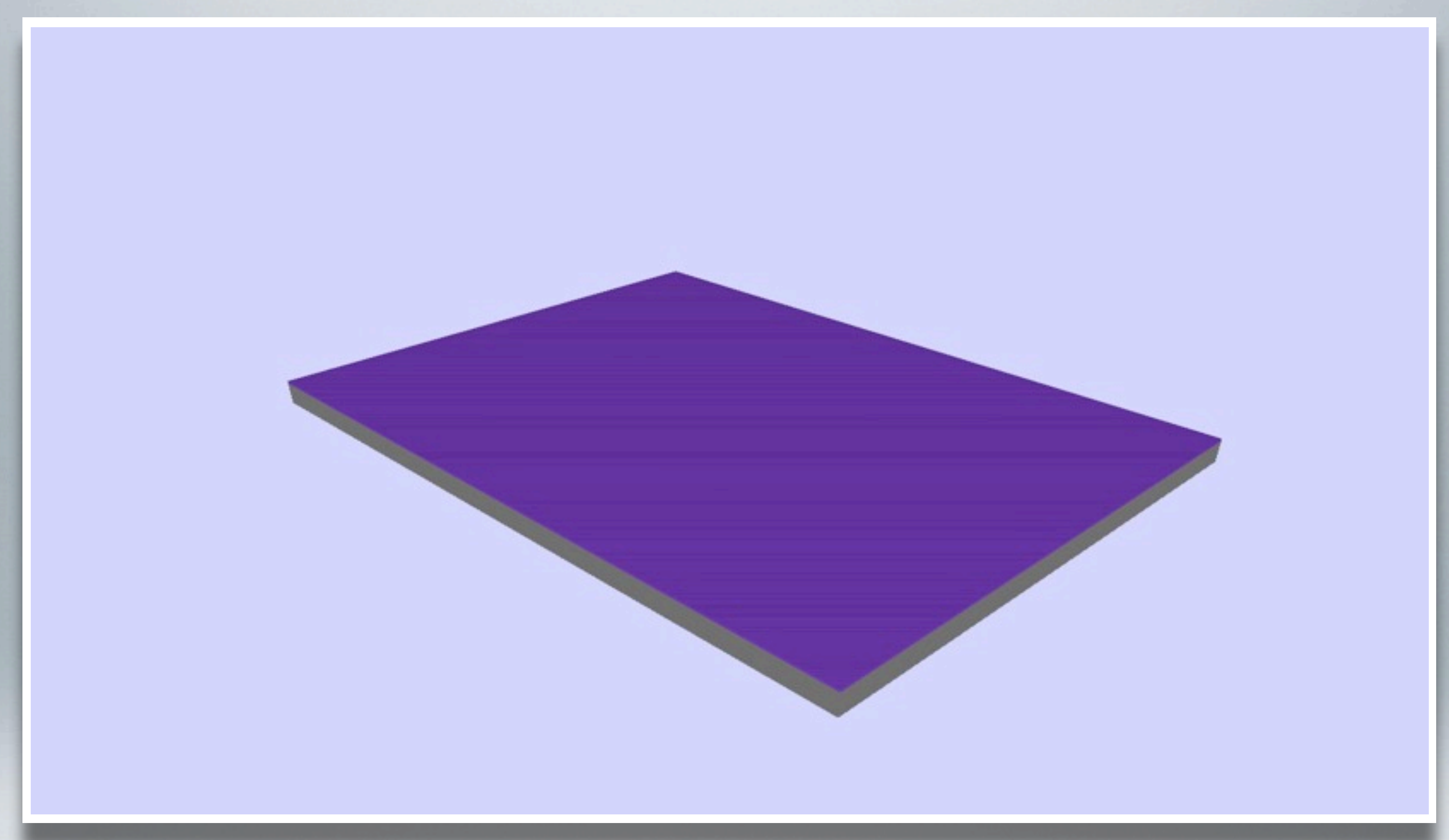
09-09-14

Generated by IntelliSuite CleanRoom



1. Substrate Si Czochralski (100)

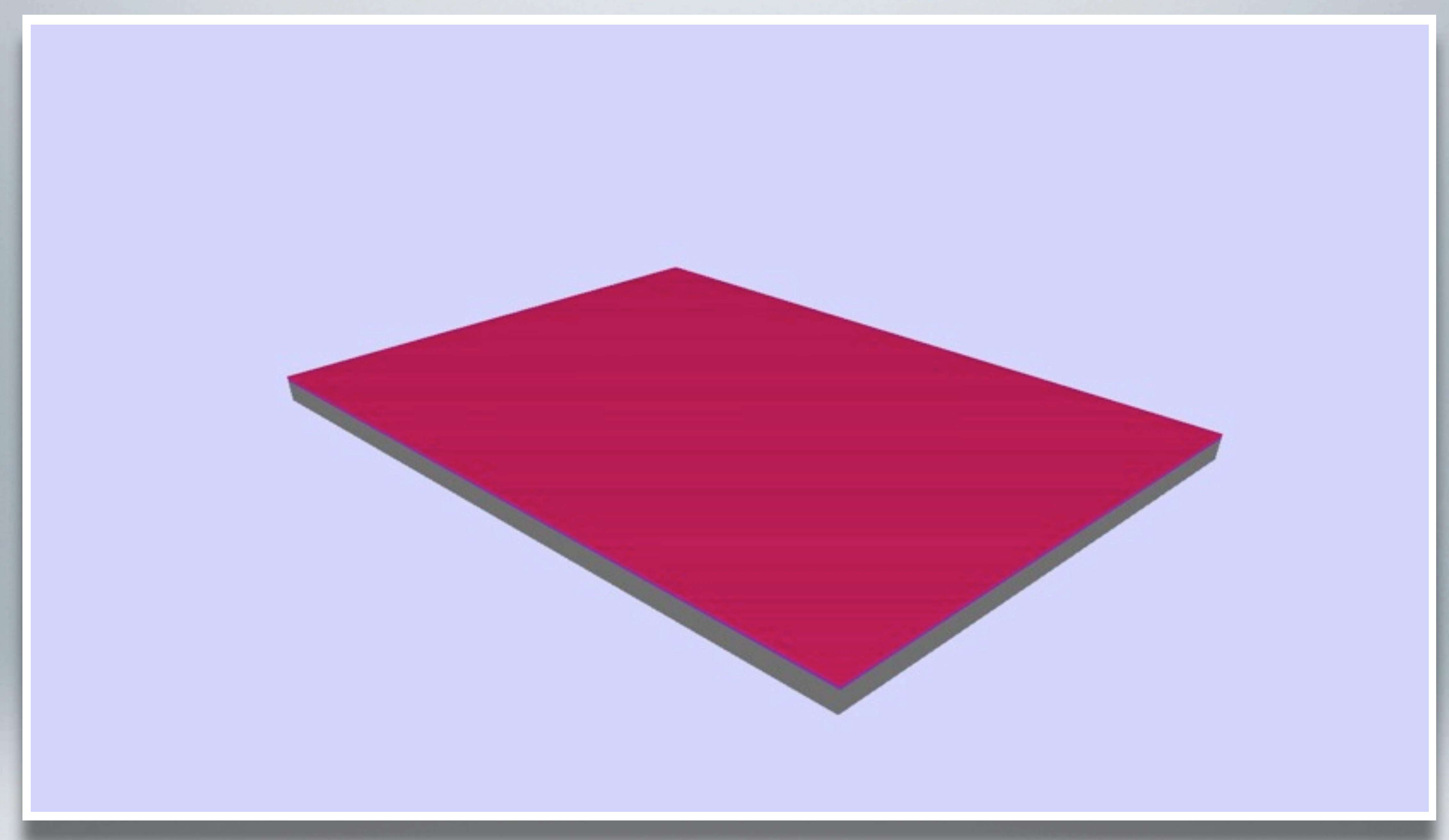
Substrate thickness: 50
(µm)
Comments:



2. Deposition Si_3N_4 PECVD (Ar)

Film Thickness: 600 nm (Conformal)

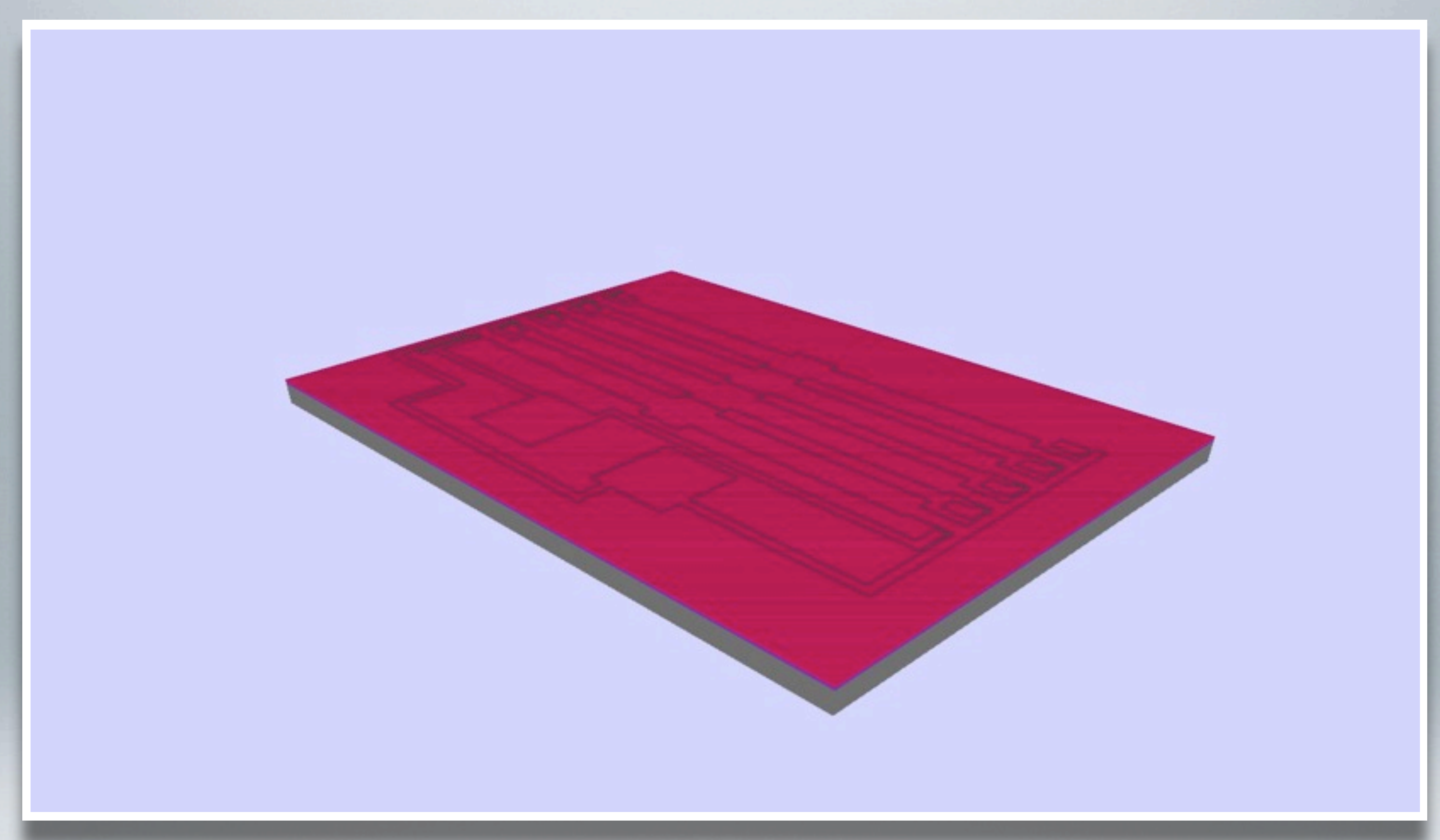
Comments:



3. Deposition PolySi LPCVD (SiH4)

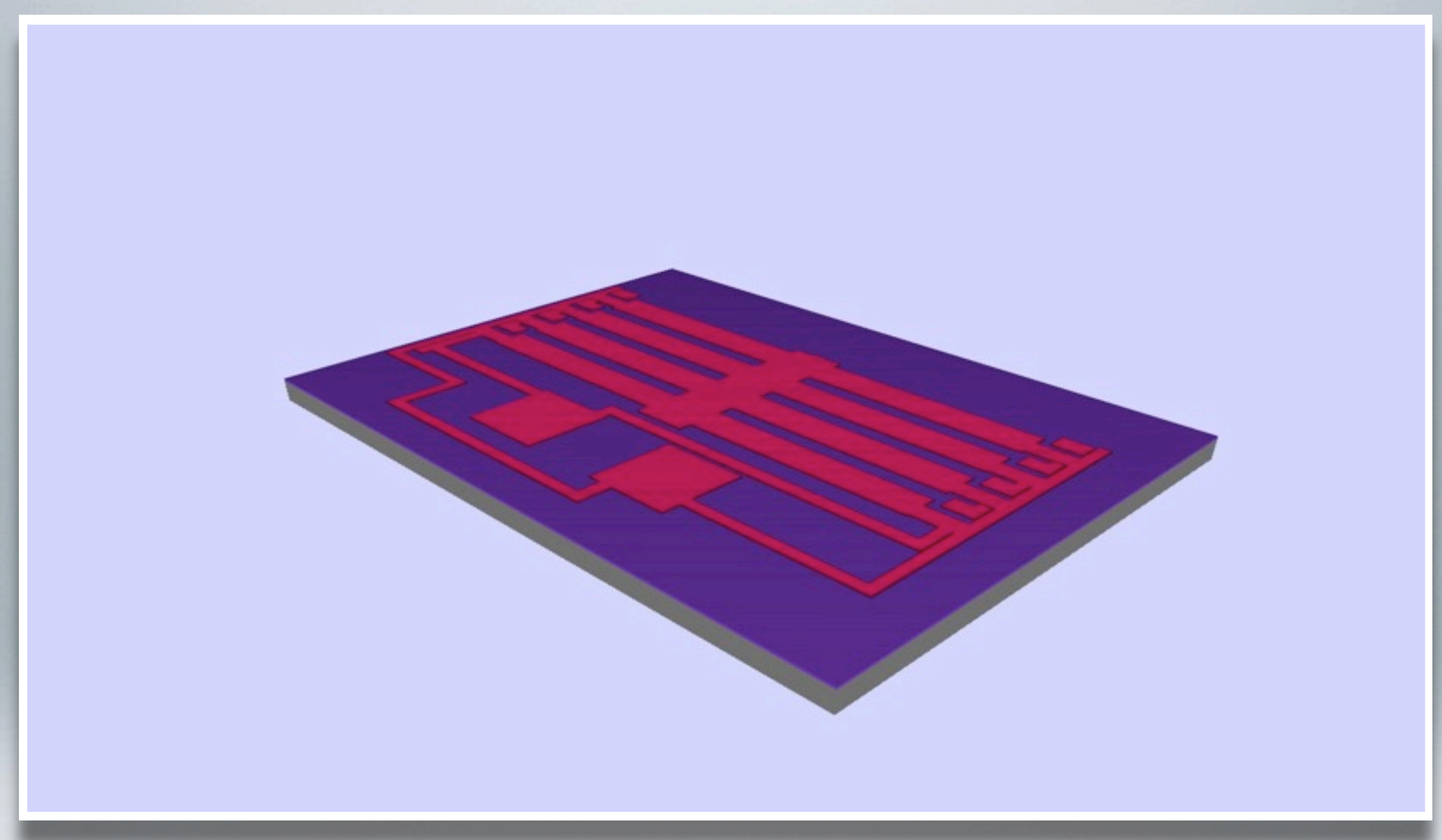
Film Thickness: 500 nm (Conformal)

Comments:Deposit GND POLY



4. Lithography UV Contact (Suss)

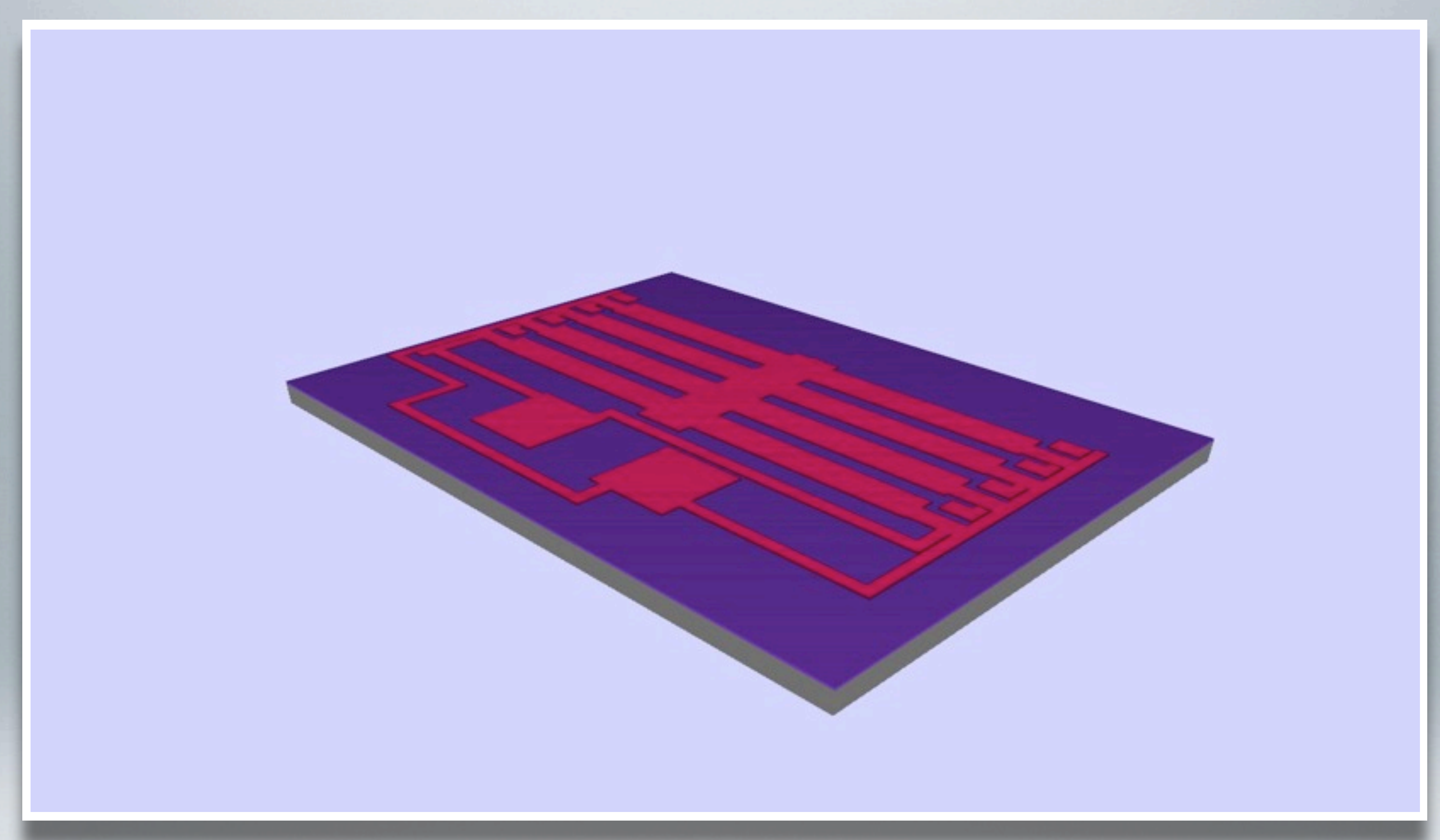
POLY0
(GDS#13);Leave Photoresist Inside
Comments:Pattern ground plane



5. Etch PolySi Dry (SF6-Plasma)

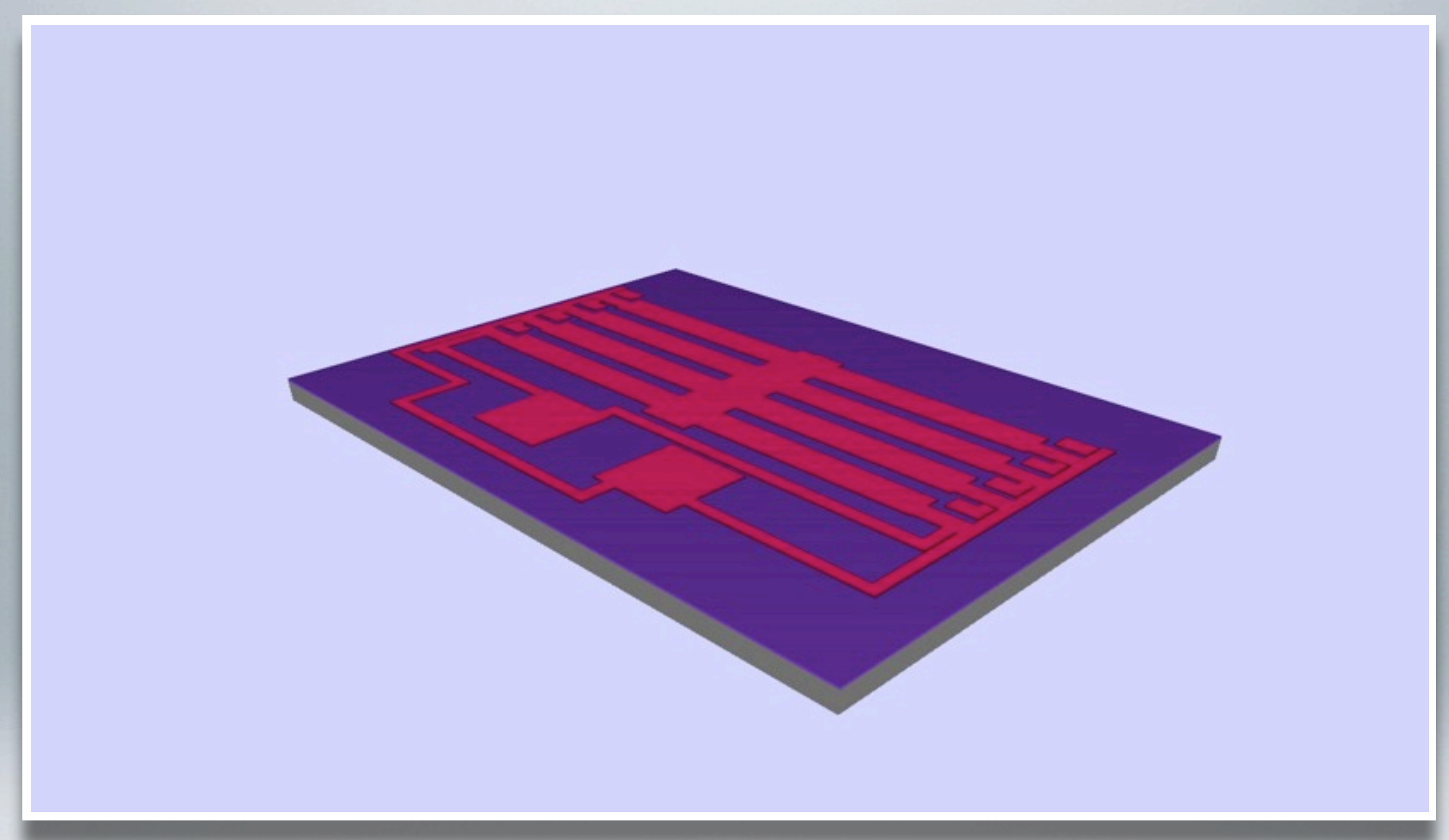
Etch Thickness: 500 nm (Etch Through)

Comments:



6. Lithography UV Contact (Suss)

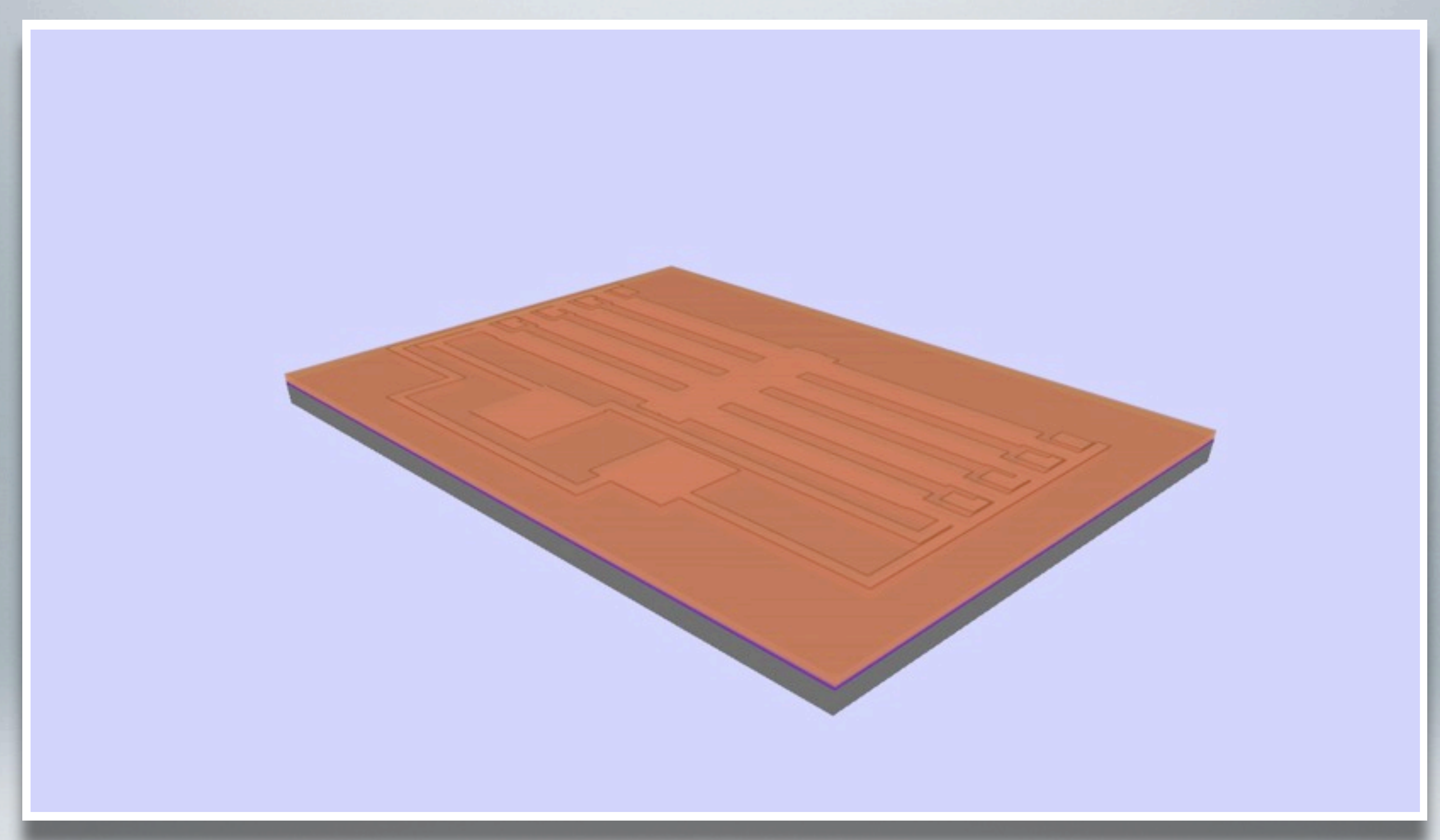
HOLE0
(GDS#41);Leave Photoresist Outside
Comments:provide holes for POLY0



7. Etch PolySi Dry (SF6-Plasma)

Etch Thickness: 500 nm (Etch Through)

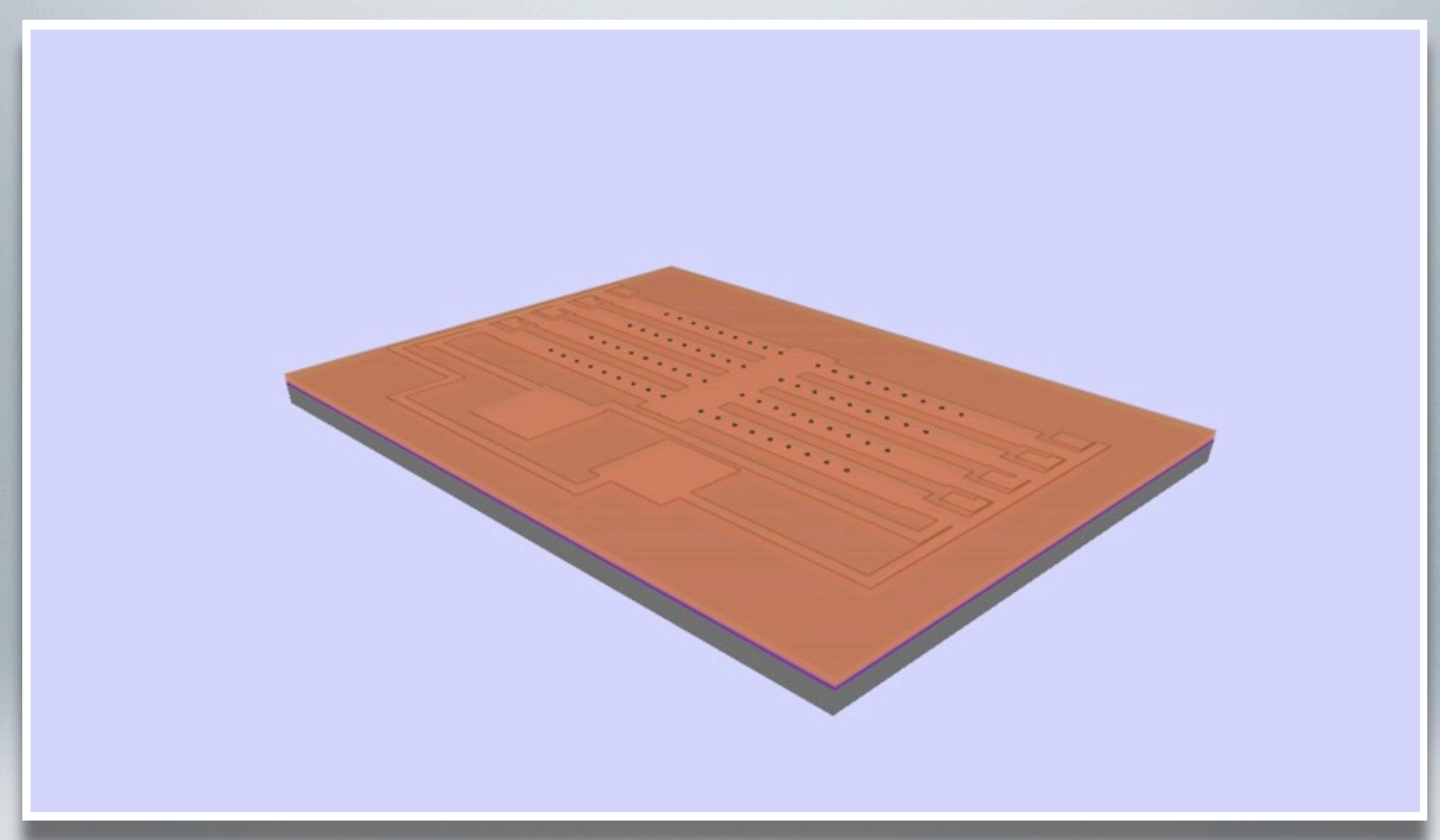
Comments:



8. Deposition PSG LPCVD (Generic)

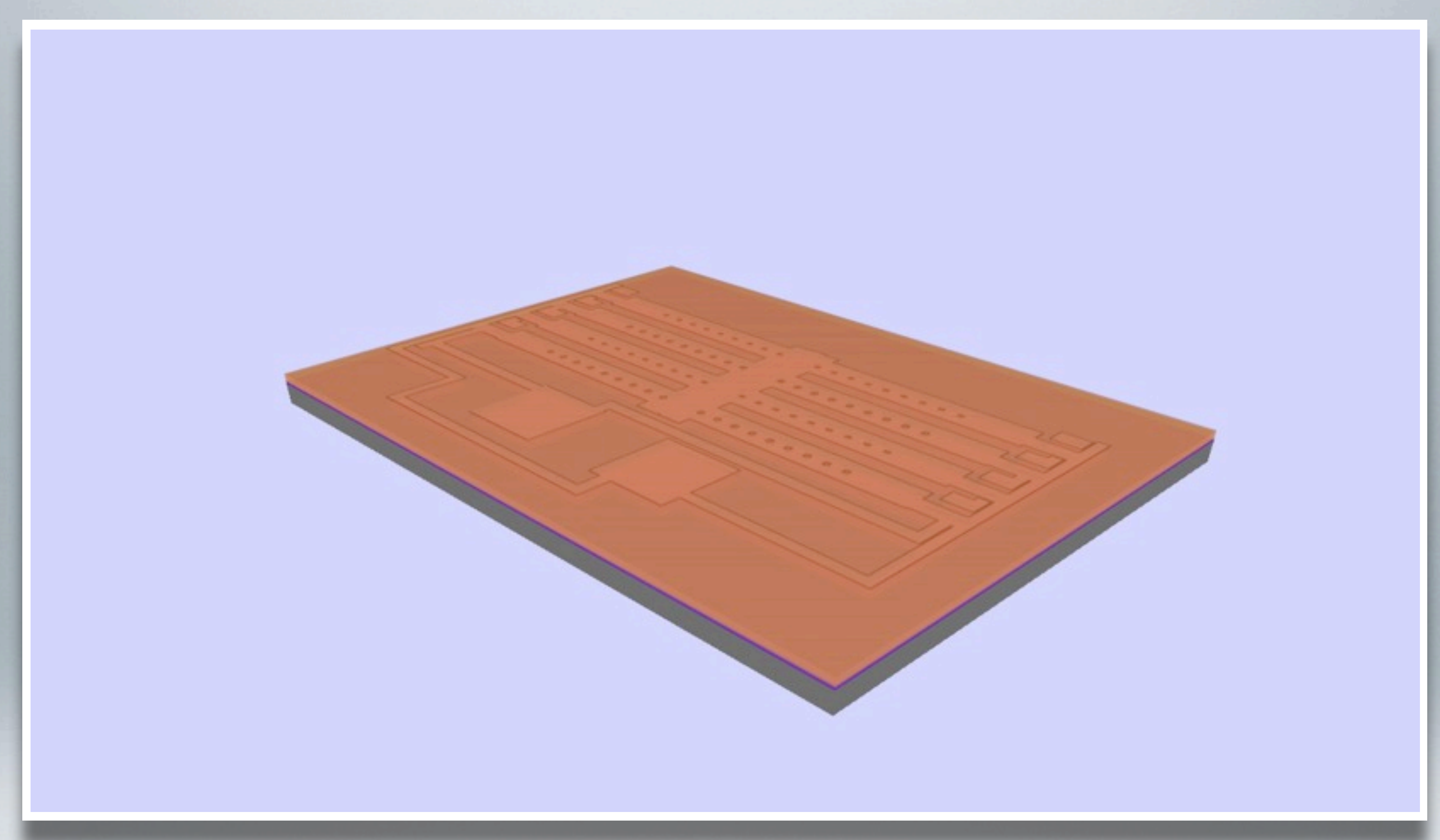
Film Thickness: 2000 nm (Conformal)

Comments:First Sacrificial PSG



9. Lithography UV Contact (Suss)

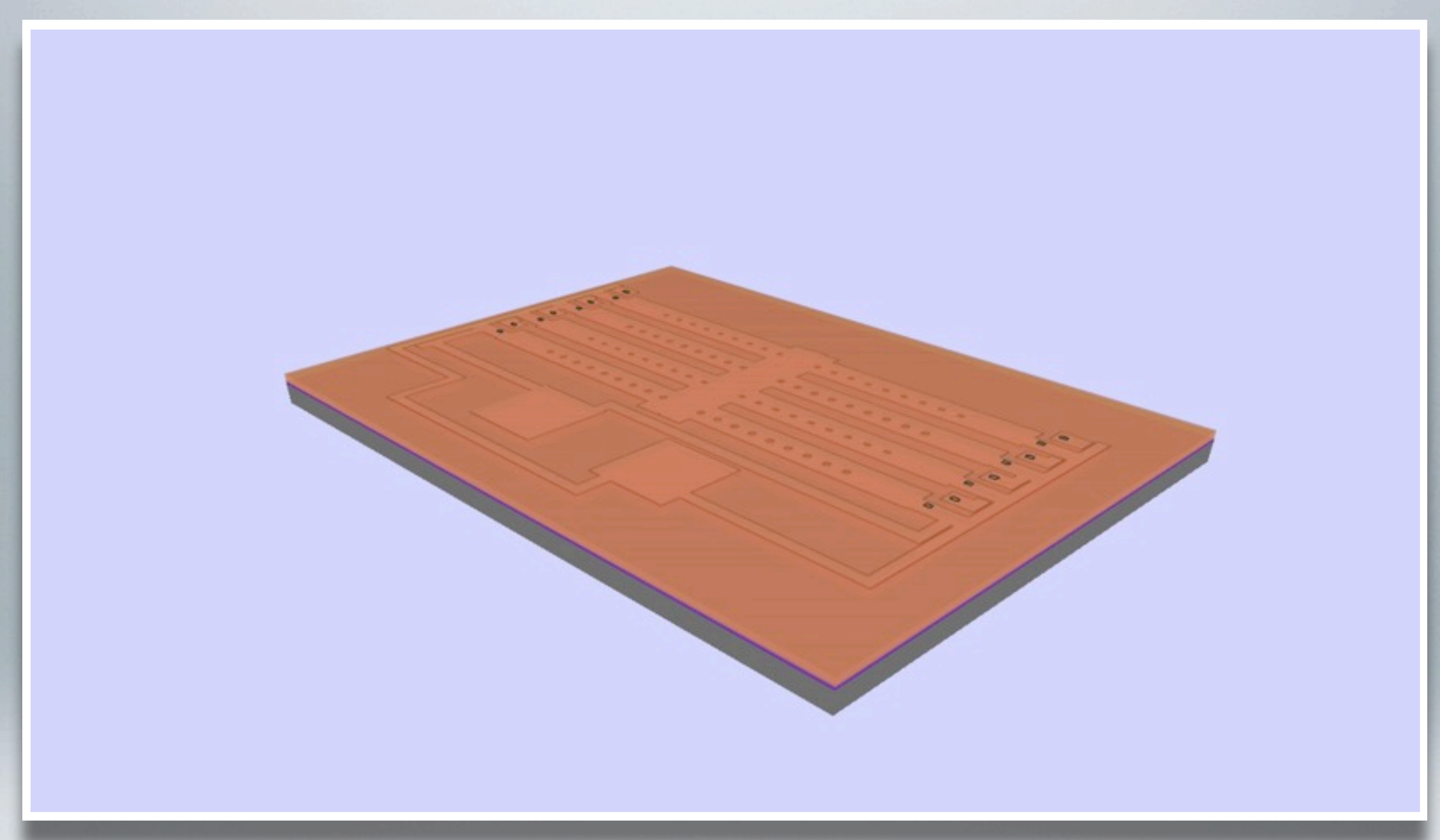
DIMPLE
(GDS#50);Leave Photoresist Outside
Comments:Dimples mask



10. Etch PSG Generic (Generic)

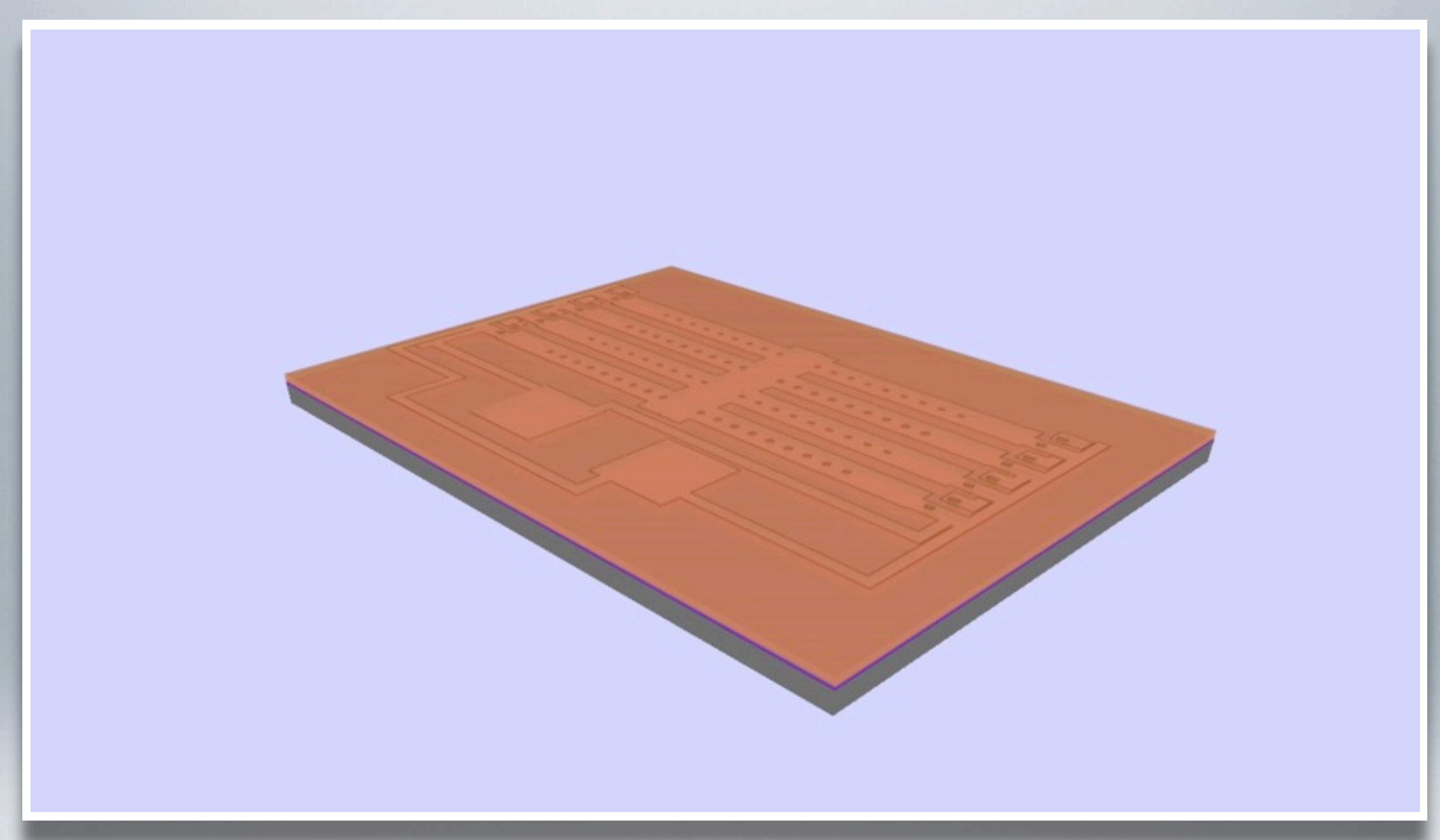
Etch Thickness: 750 nm (Partial Etch)

Comments:



11. Lithography UV Contact (Suss)

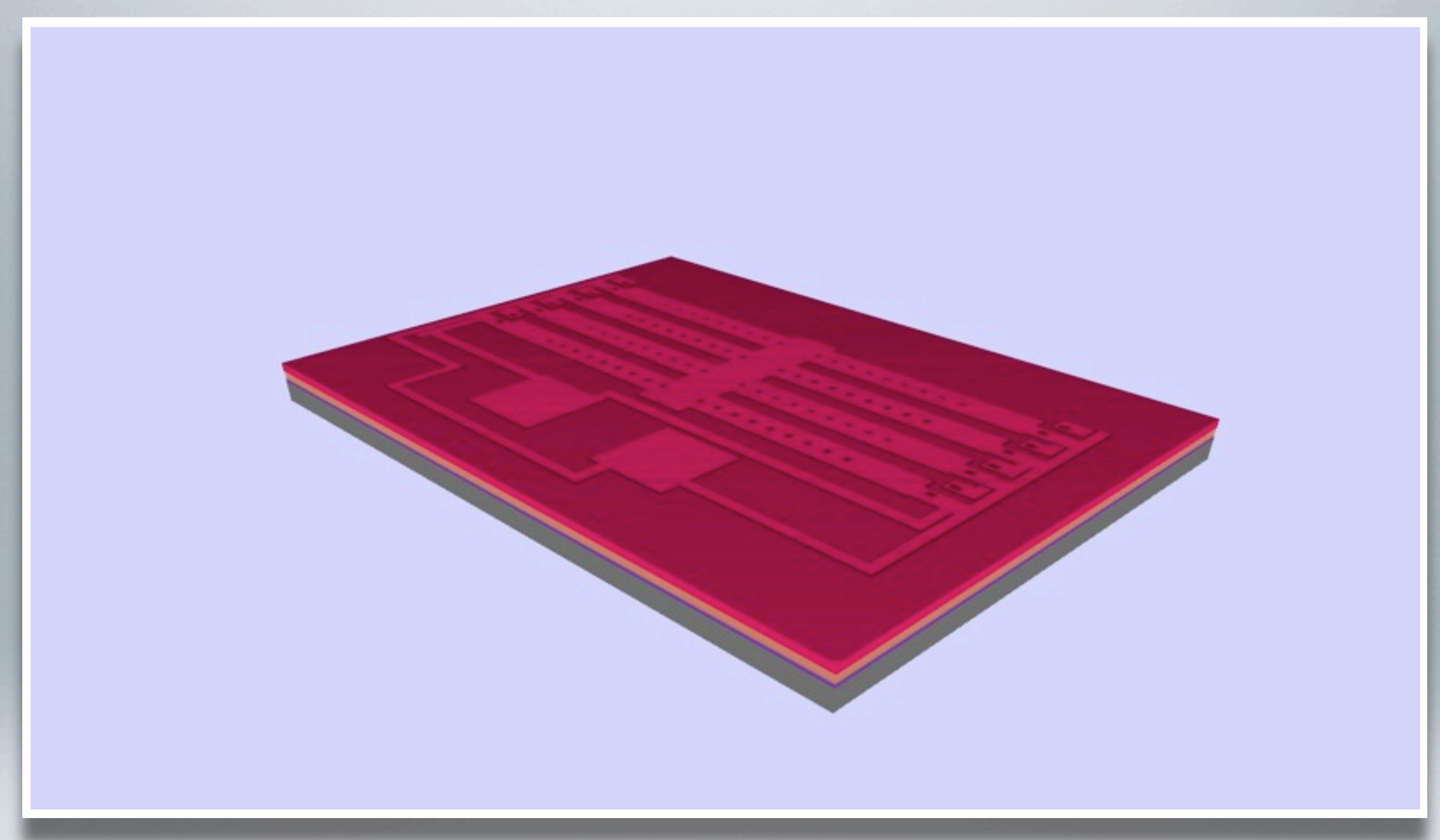
ANCHOR1
(GDS#43);Leave Photoresist Outside
Comments:Anchor 1 mask



12. Etch PSG Generic (Generic)

Etch Thickness: 2000 nm (Etch Through)

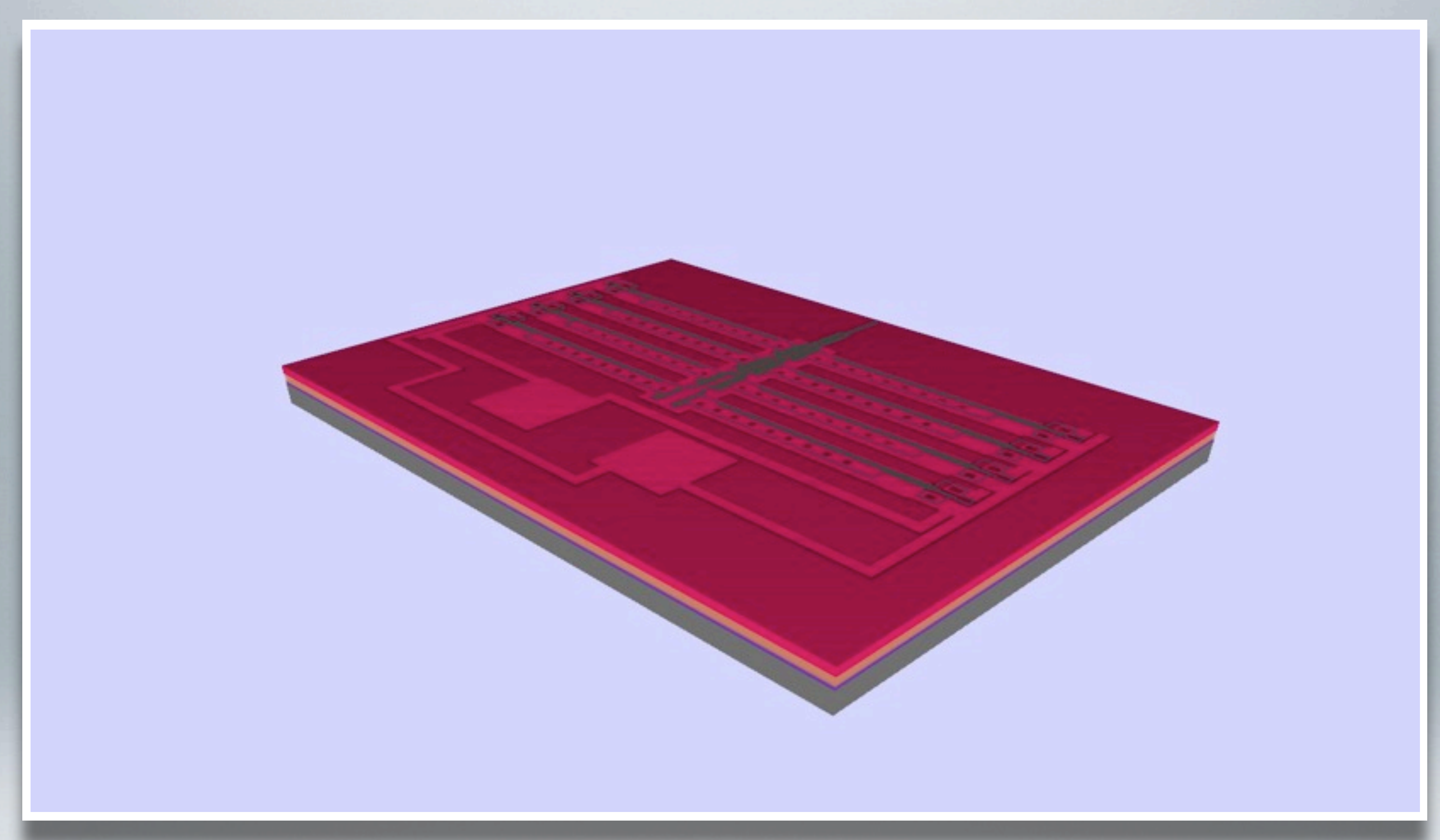
Comments:



13. Deposition PolySi LPCVD (SiH_4)

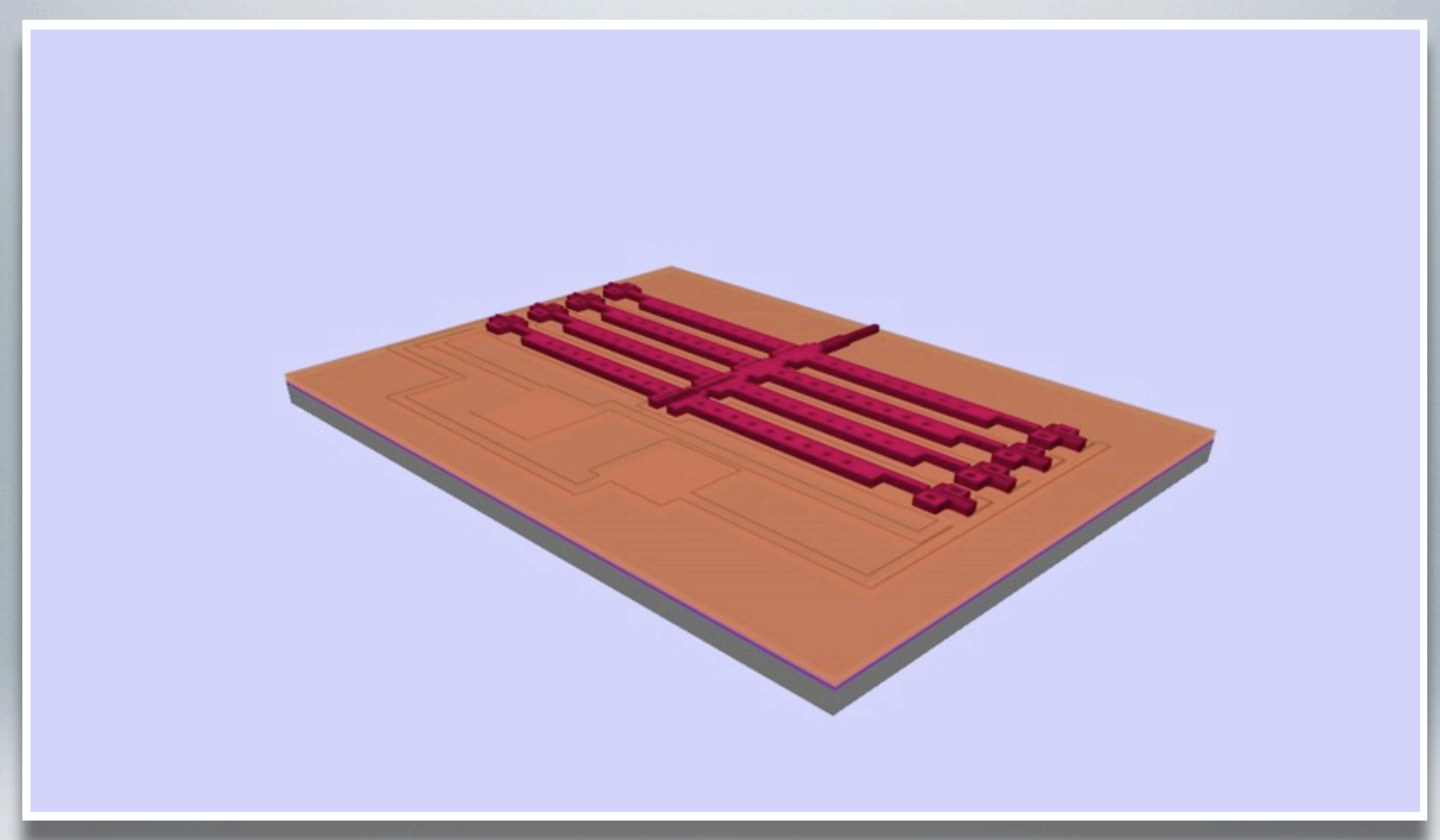
Film Thickness: 2000 nm (Conformal)

Comments:Deposition of second poly (POLY1)



14. Lithography UV Contact (Suss)

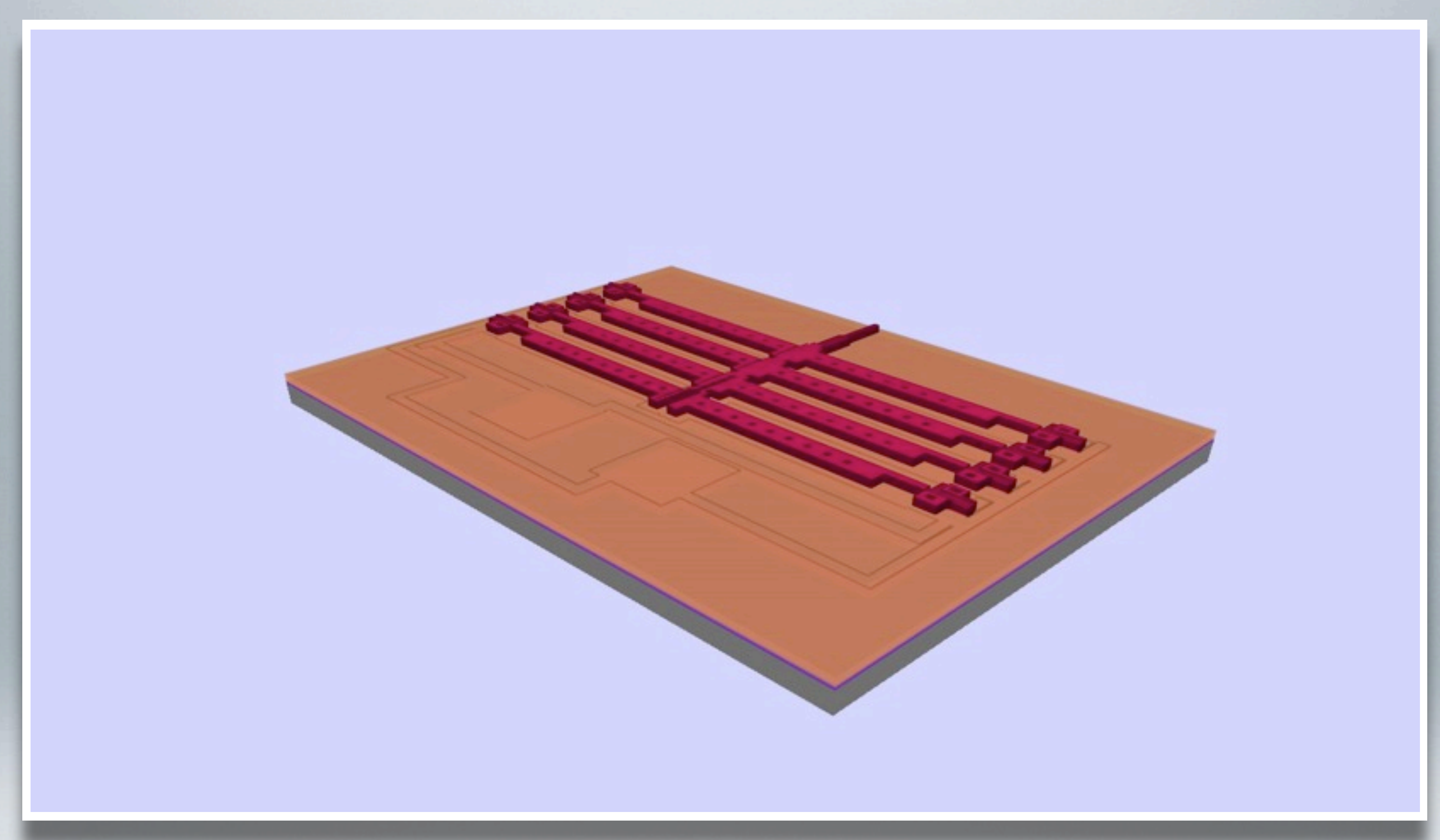
POLY1
(GDS#45);Leave Photoresist Inside
Comments:Define POLY1, first structural layer



15. Etch PolySi Dry (SF6-Plasma)

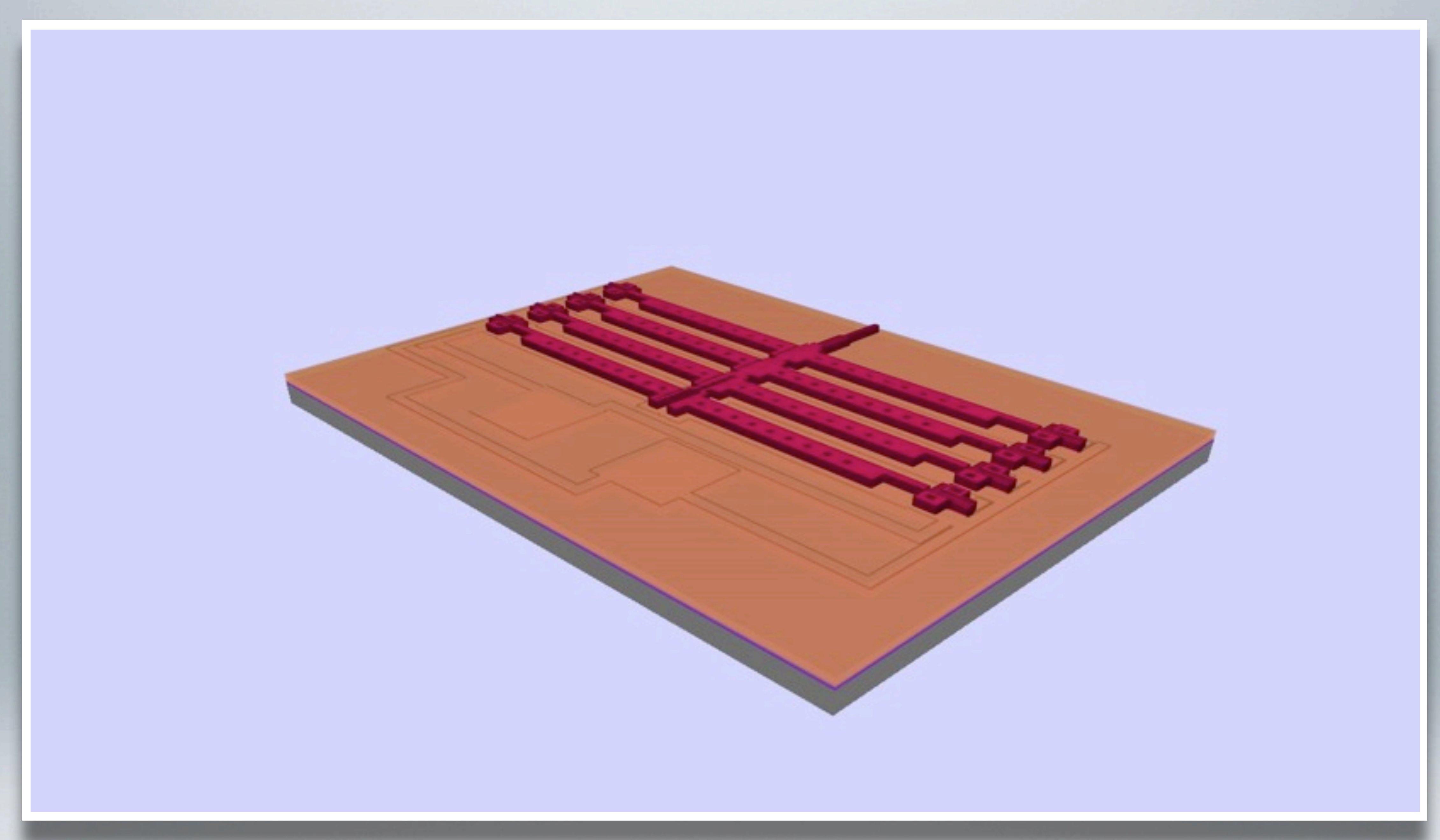
Etch Thickness: 2000 nm (Etch Through)

Comments:



16. Lithography UV Contact (Suss)

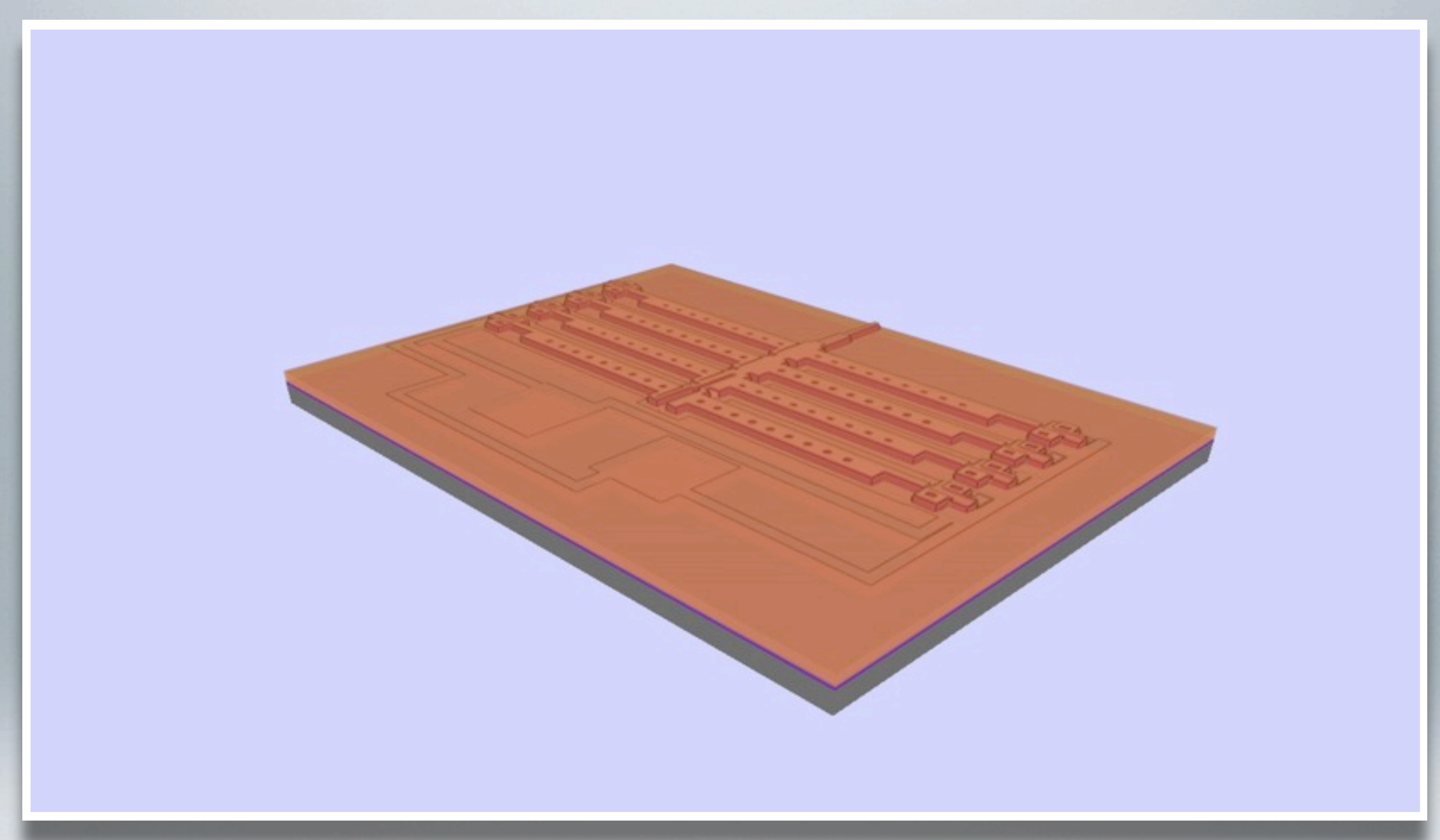
HOLE1
(GDS#0);Leave Photoresist Outside
Comments:provide holes for POLY1



17. Etch PolySi Dry (SF6-Plasma)

Etch Thickness: 2000 nm (Etch Through)

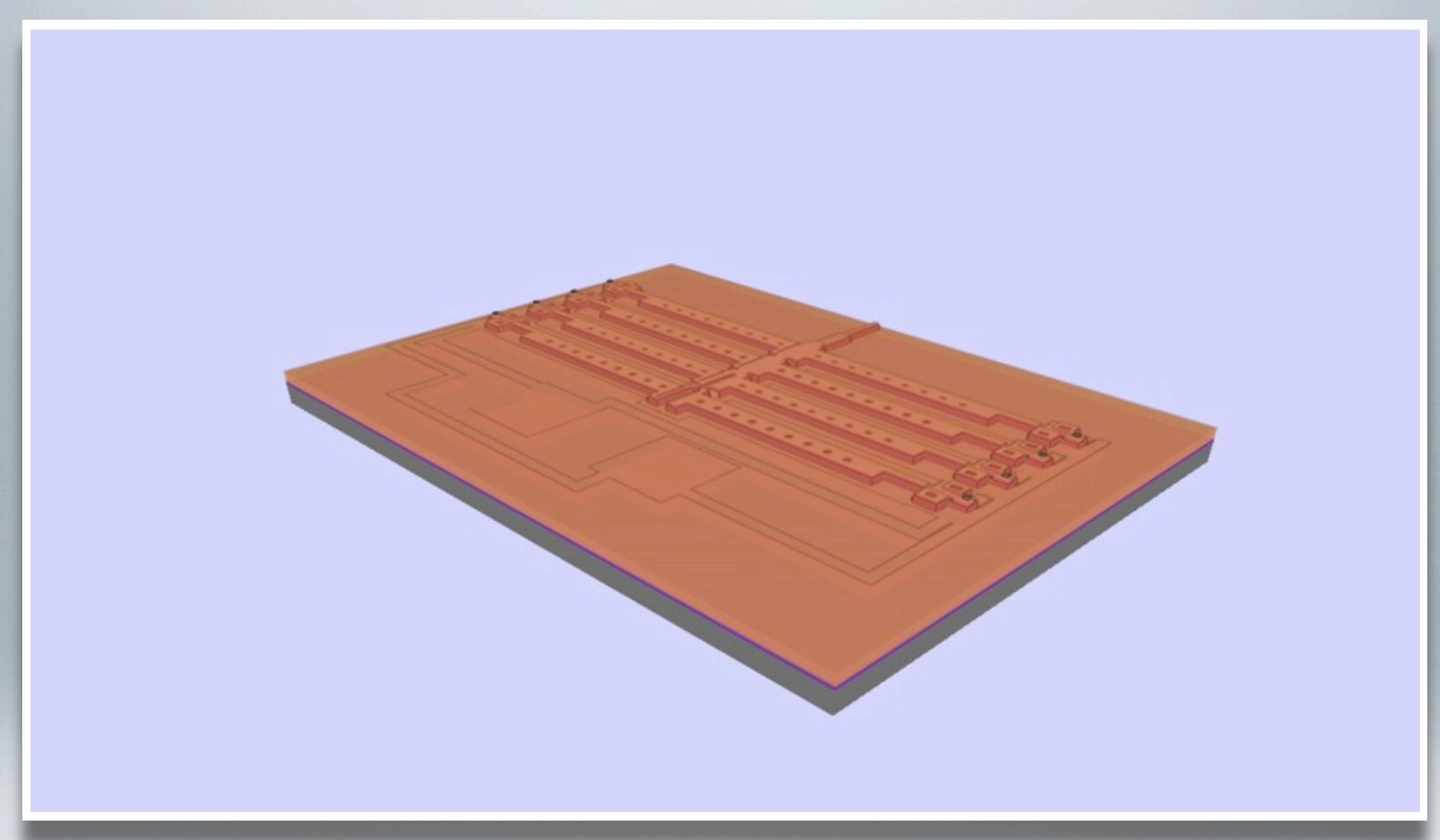
Comments:



18. Deposition PSG Generic (Generic)

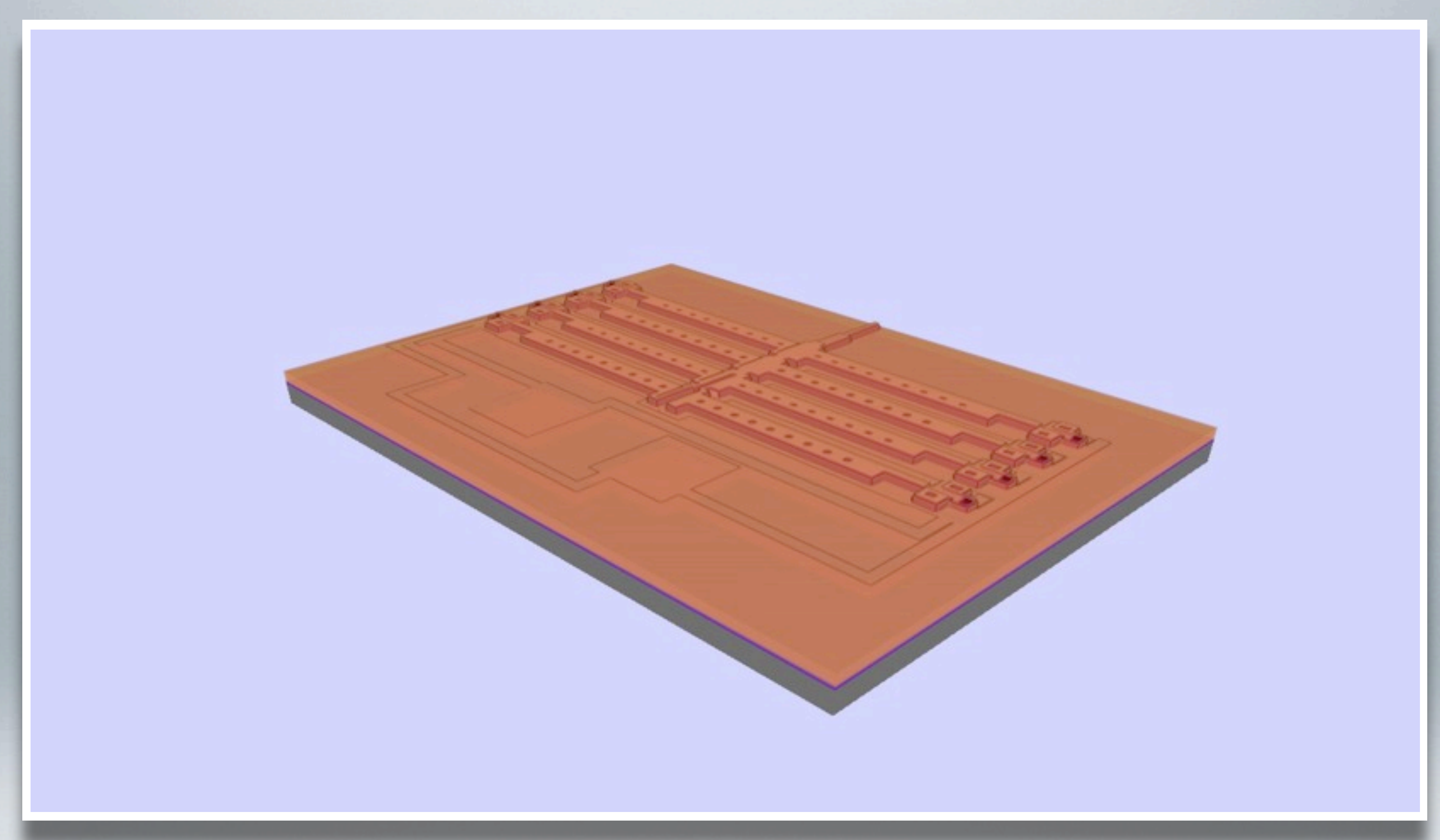
Film Thickness: 750 nm (Conformal)

Comments:Deposition of second sacrificial PSG



19. Lithography UV Contact (Suss)

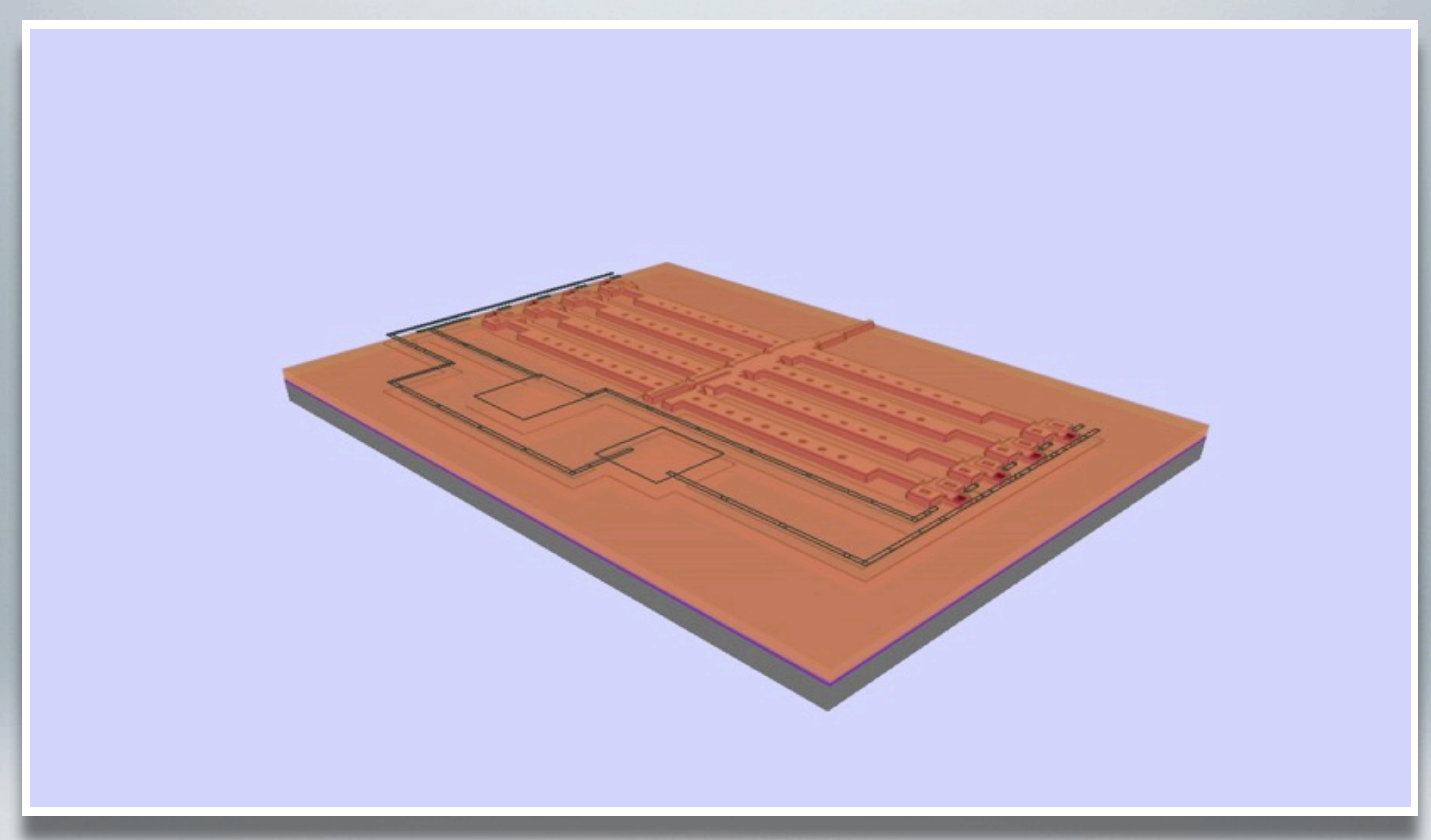
POLY1_POLY2_VIA
(GDS#47);Leave Photoresist Outside
Comments:P1P2VIA, Provide structural via to connect POLY1 and POLY2



20. Etch PSG Generic (Generic)

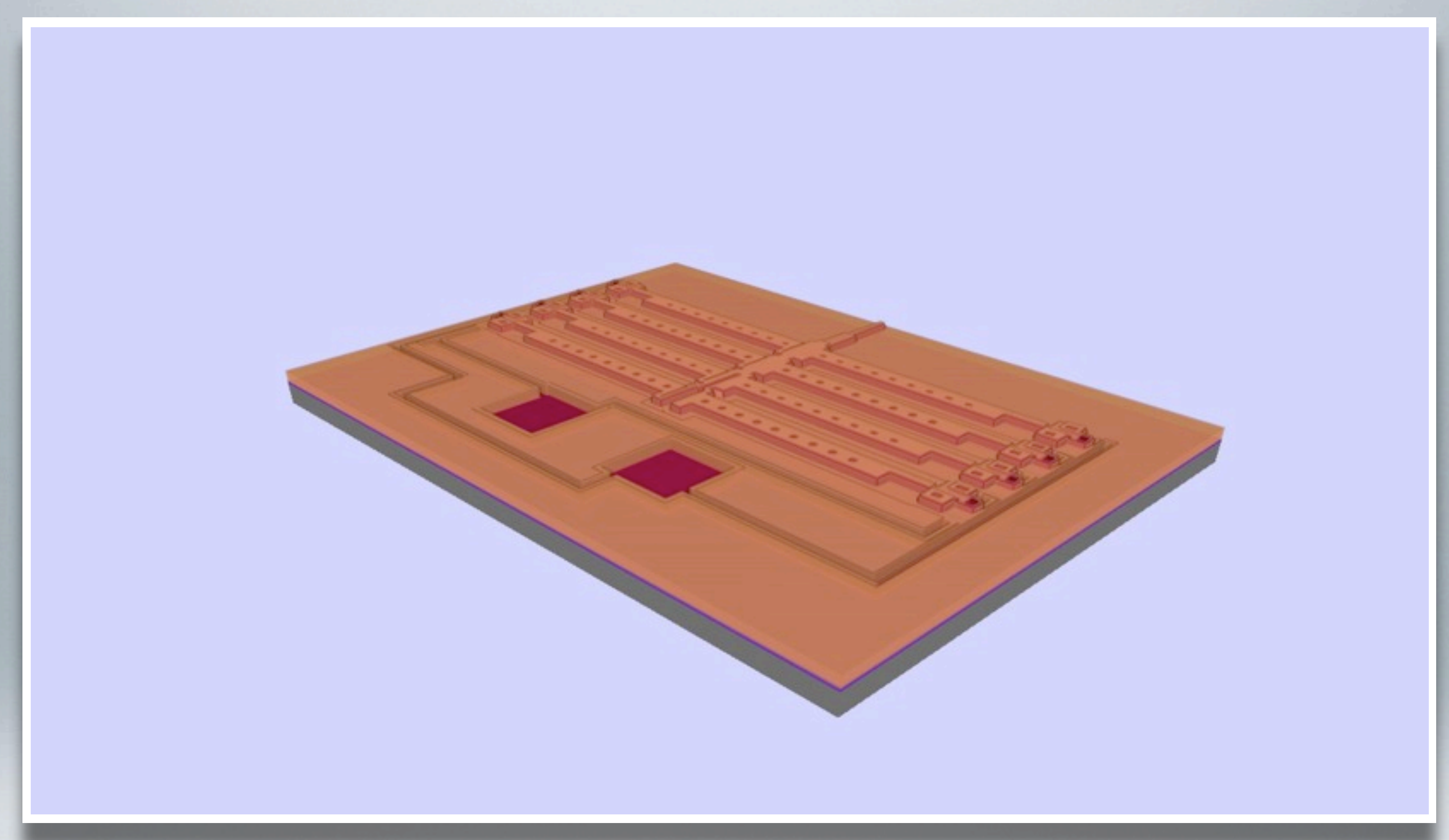
Etch Thickness: 750 nm (Etch Through)

Comments:



21. Lithography UV Contact (Suss)

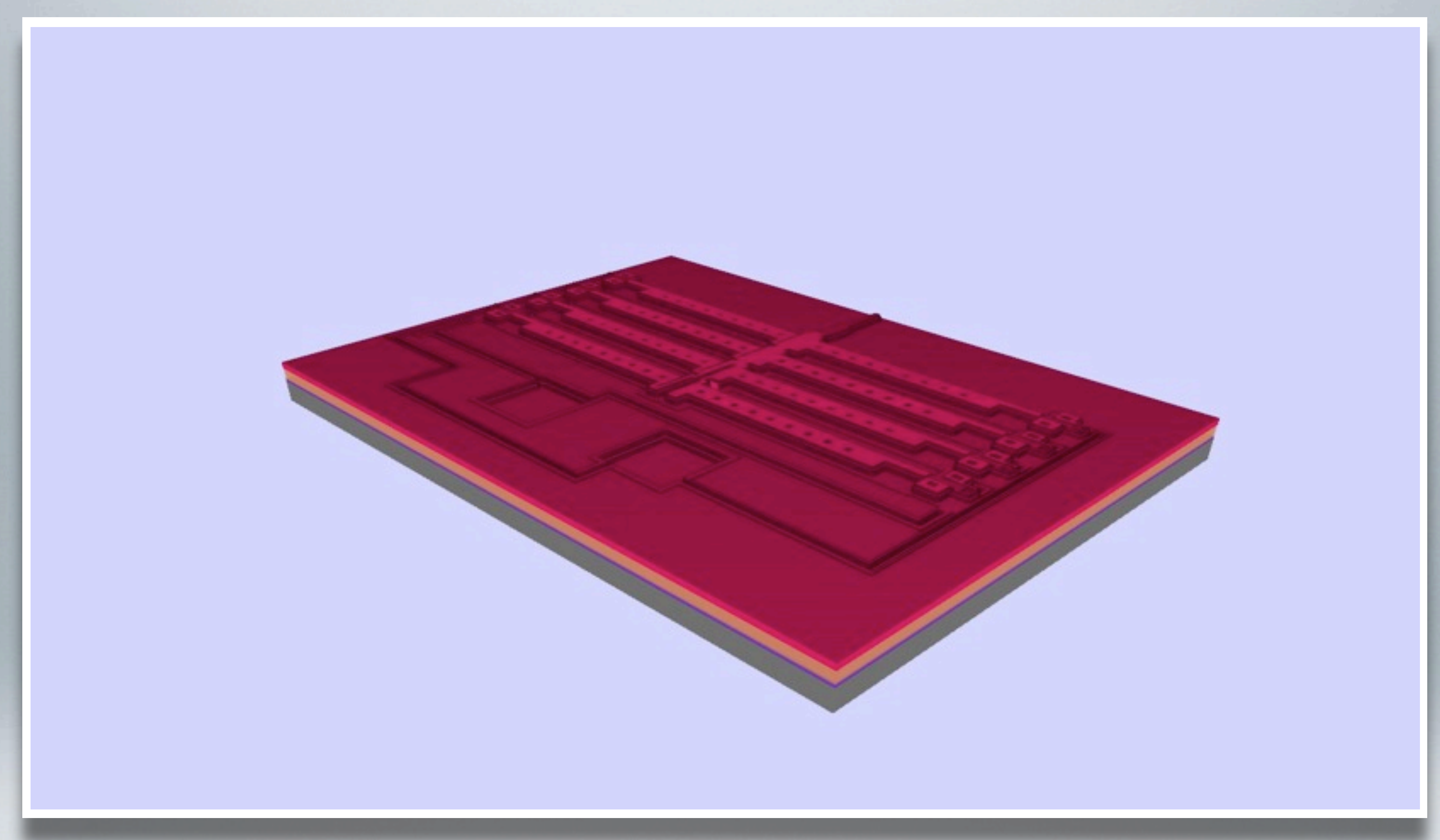
ANCHOR2
(GDS#52);Leave Photoresist Outside
Comments:ANCHOR2: Provide Anchors for second structural POLY



22. Etch PSG Generic (Generic)

Etch Thickness: 750 nm (Etch Through)

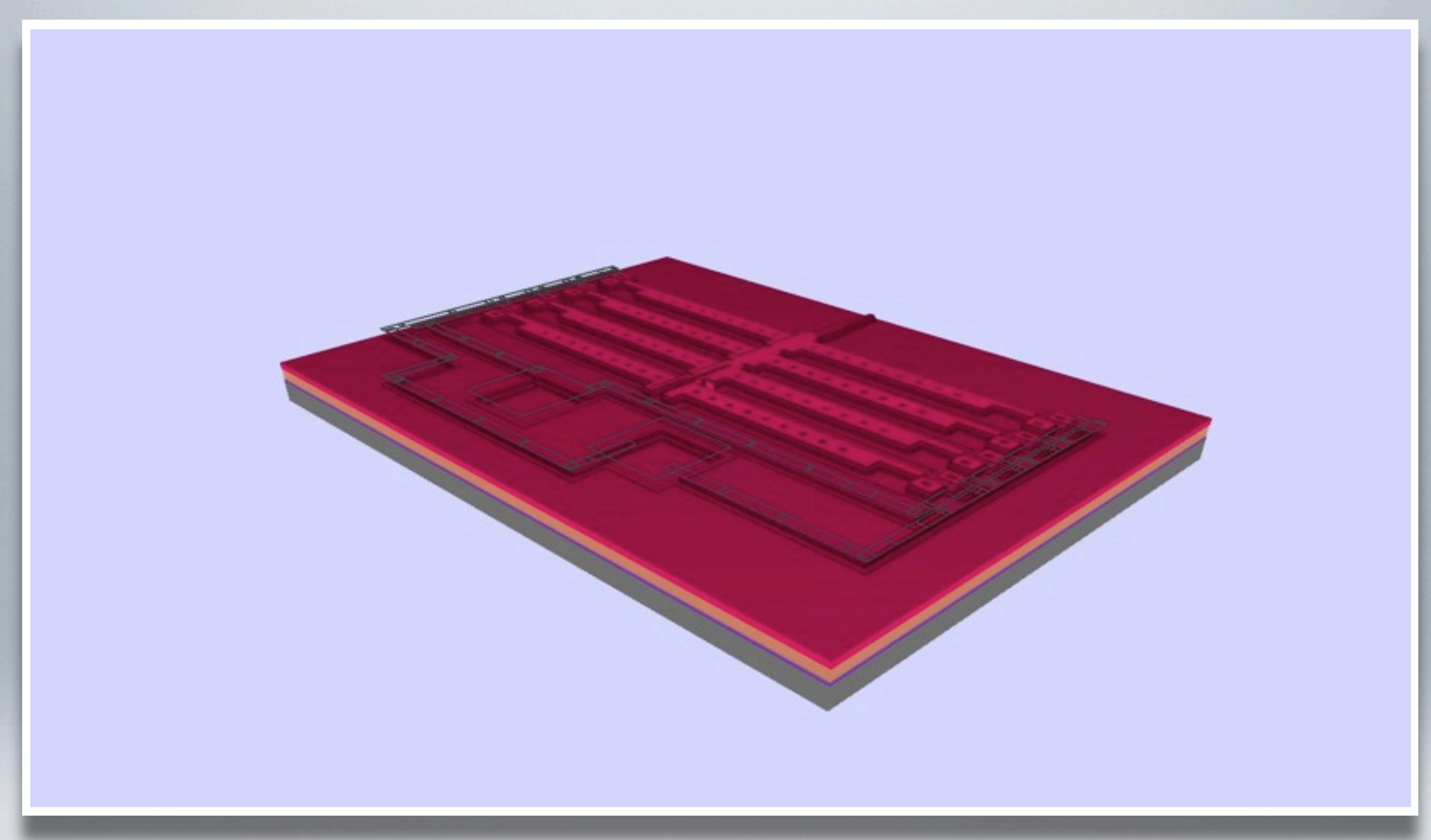
Comments:



23. Deposition PolySi LPCVD (SiH4)

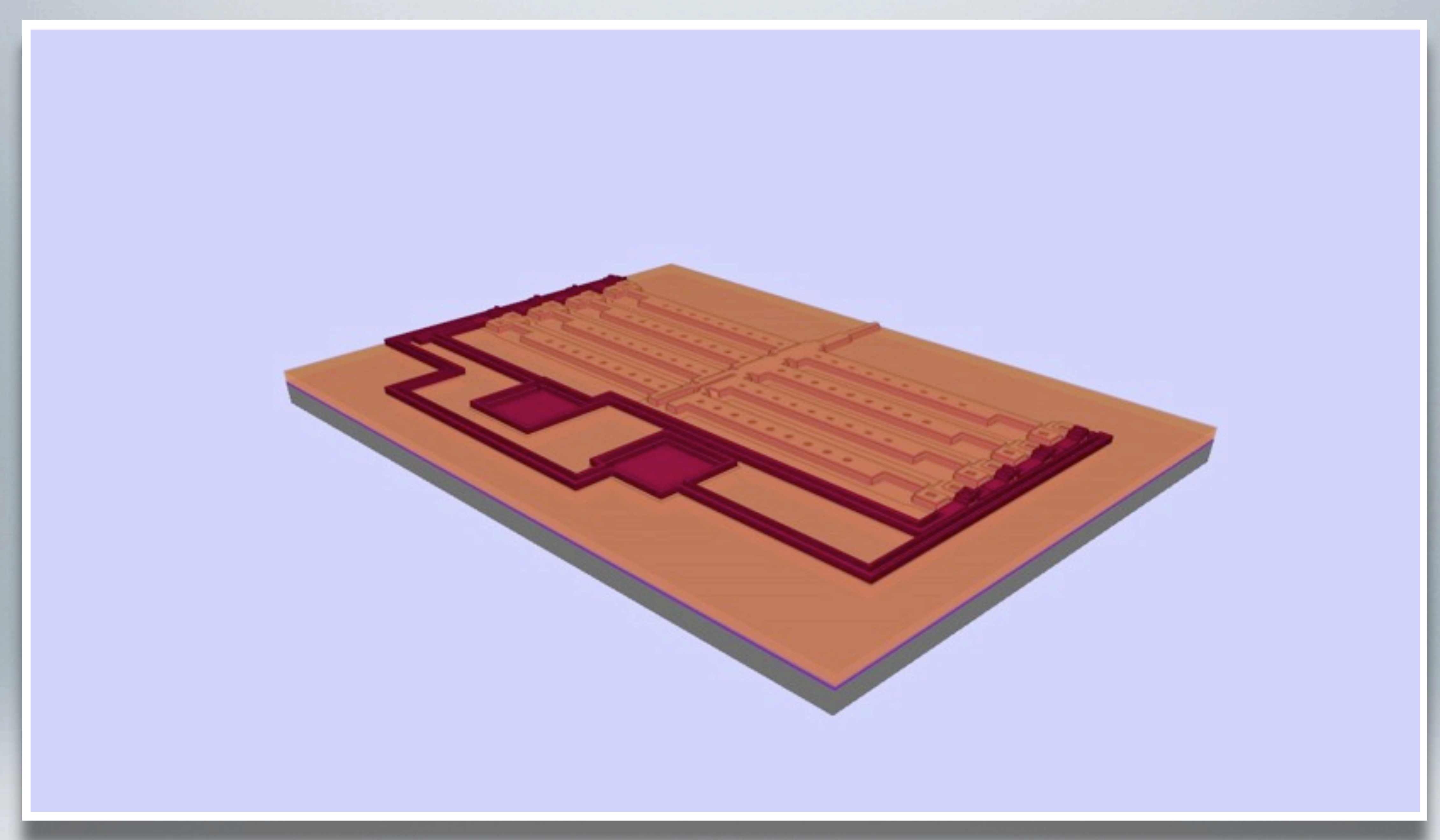
Film Thickness: 1500 nm (Conformal)

Comments:Deposition of second strucutral POLY (POLY2)



24. Lithography UV Contact (Suss)

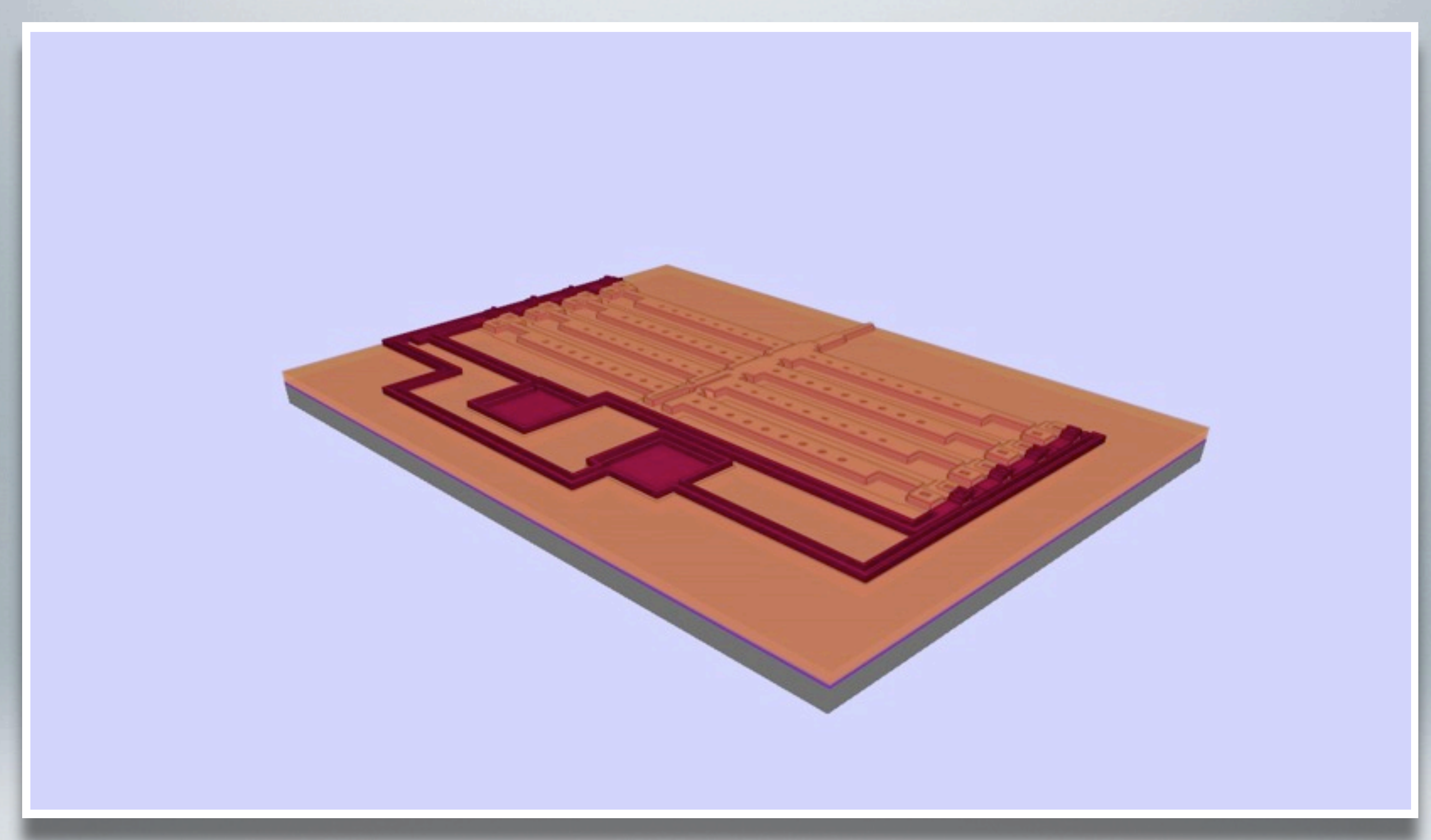
POLY2
(GDS#49);Leave Photoresist Inside
Comments:Define second structural level (POLY2)



25. Etch PolySi Dry (SF6-Plasma)

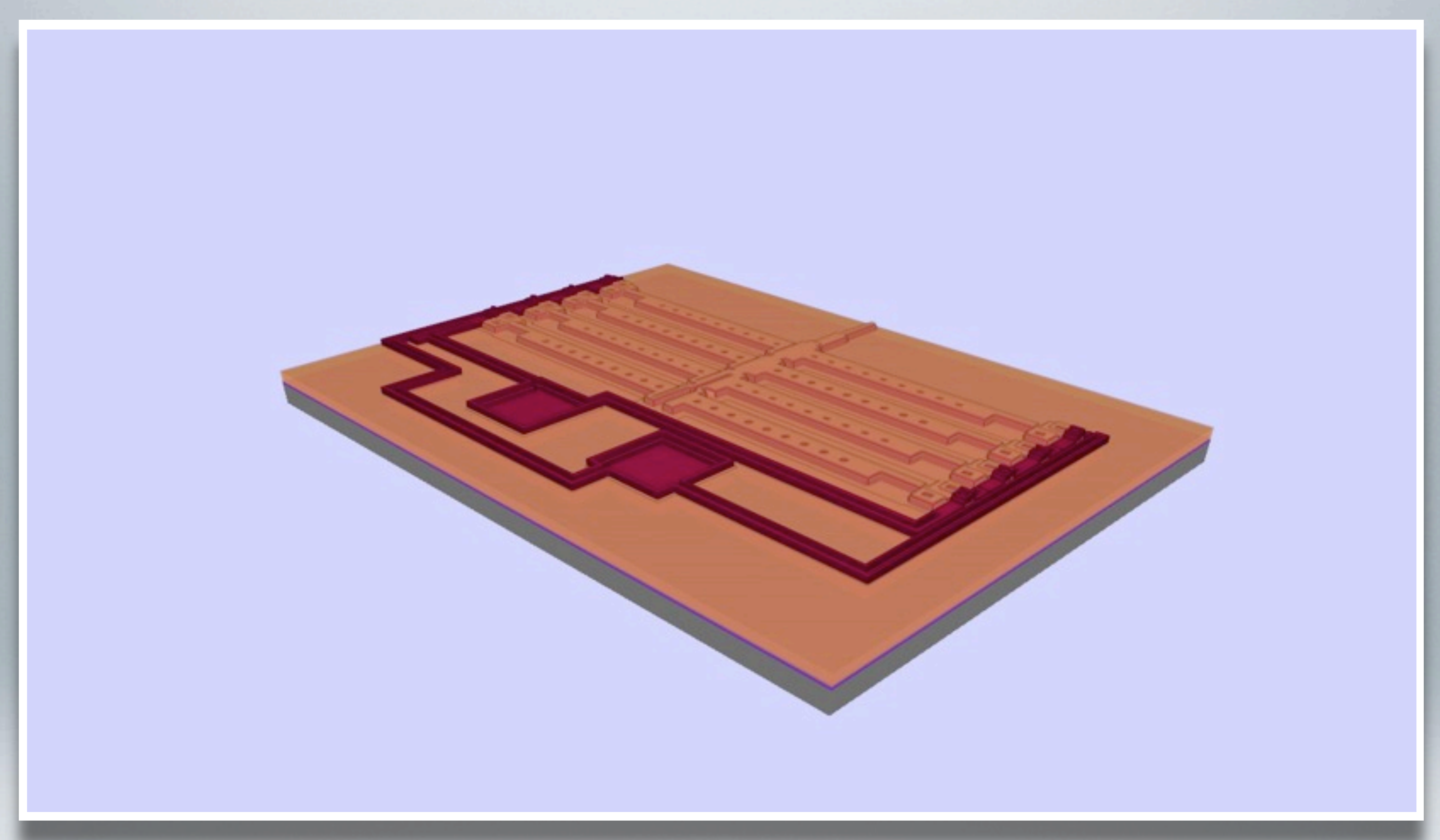
Etch Thickness: 1500 nm (Etch Through)

Comments:



26. Lithography UV Contact (Suss)

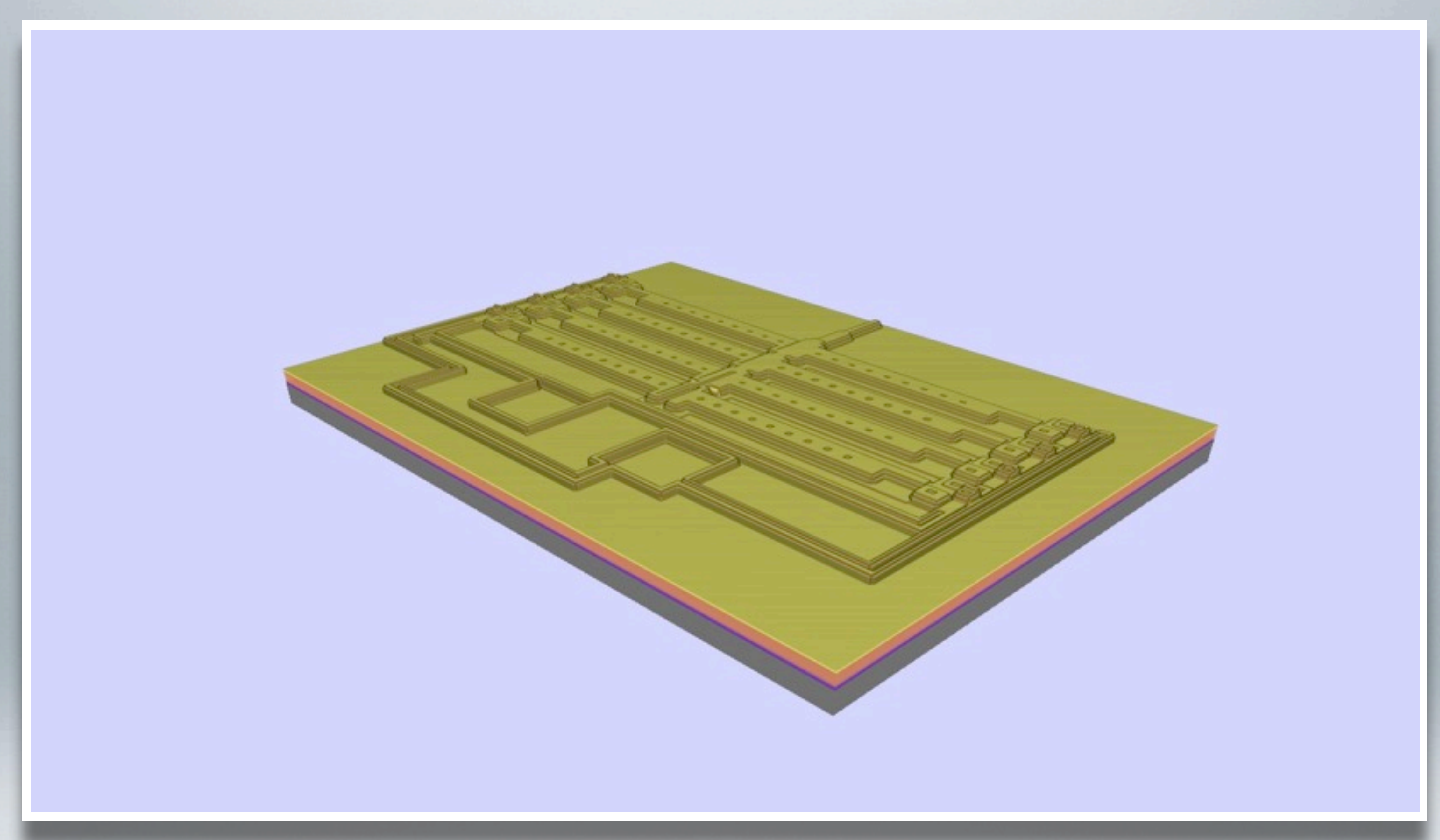
HOLE2
(GDS#1);Leave Photoresist Outside
Comments:provide holes for POLY2



27. Etch PolySi Dry (SF6-Plasma)

Etch Thickness: 1500 nm (Etch Through)

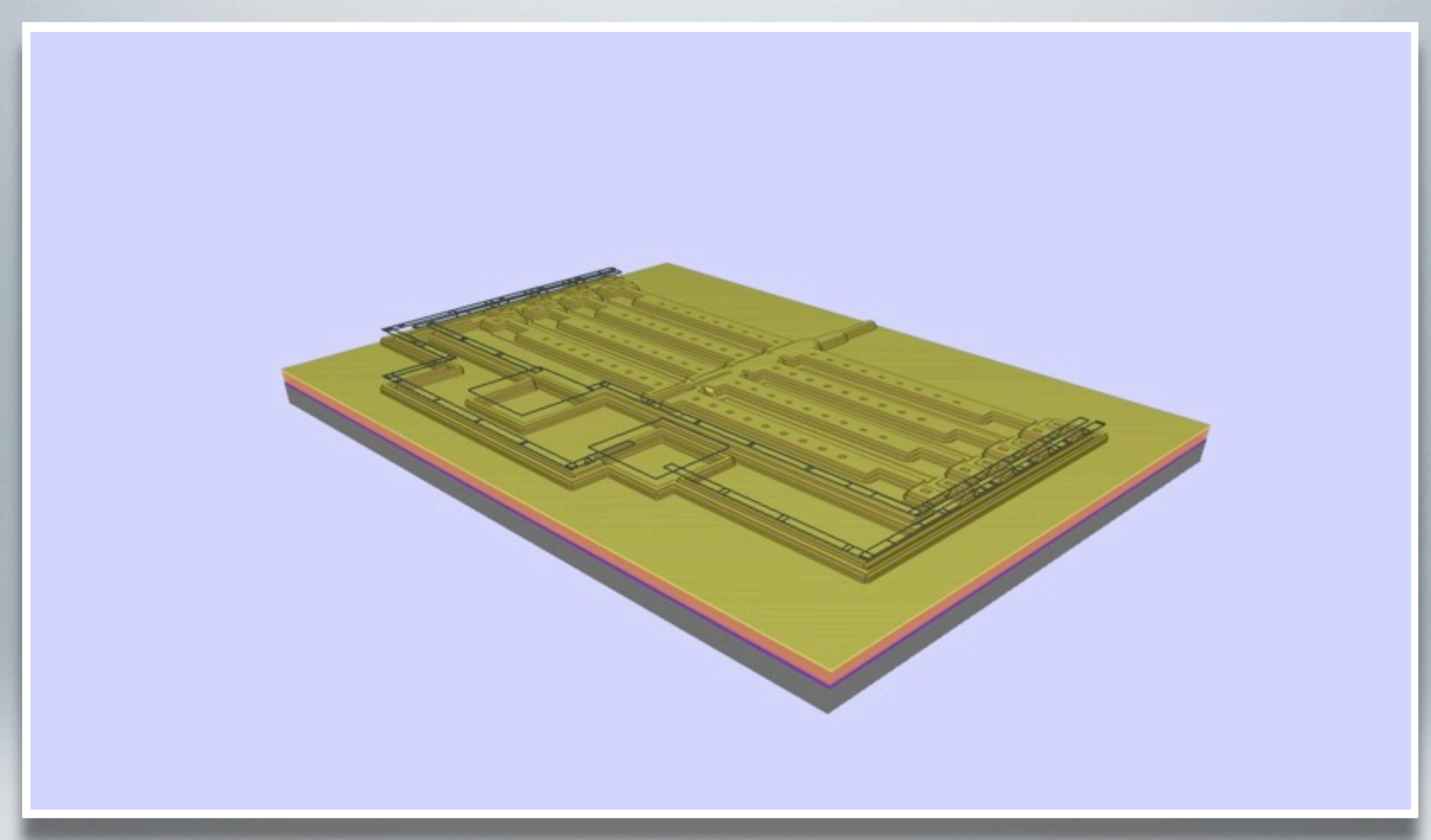
Comments:



28. Deposition PR-S3800 Spin (S3810)

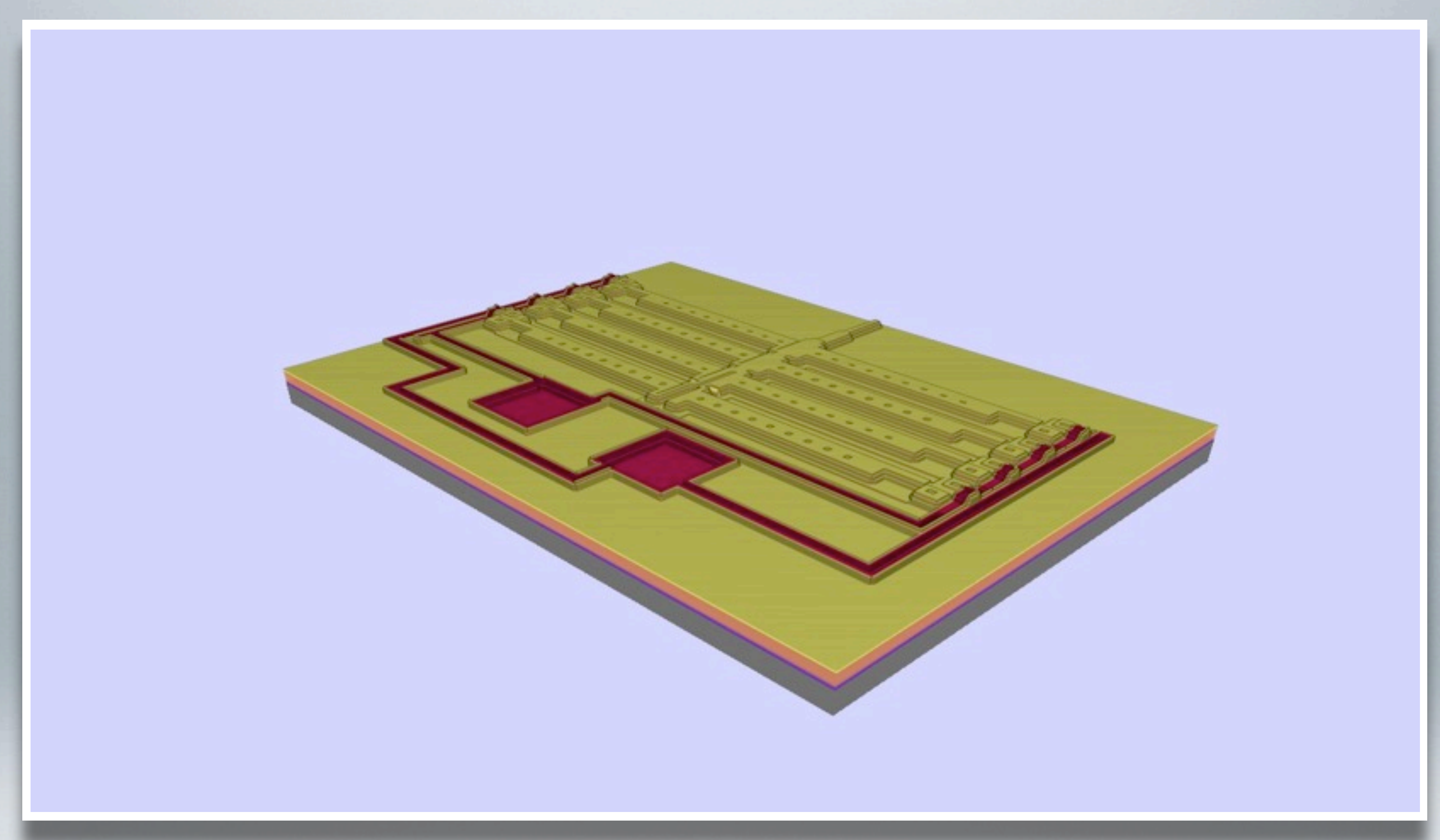
Film Thickness: 500 nm (Conformal)

Comments:



29. Lithography UV Contact (Suss)

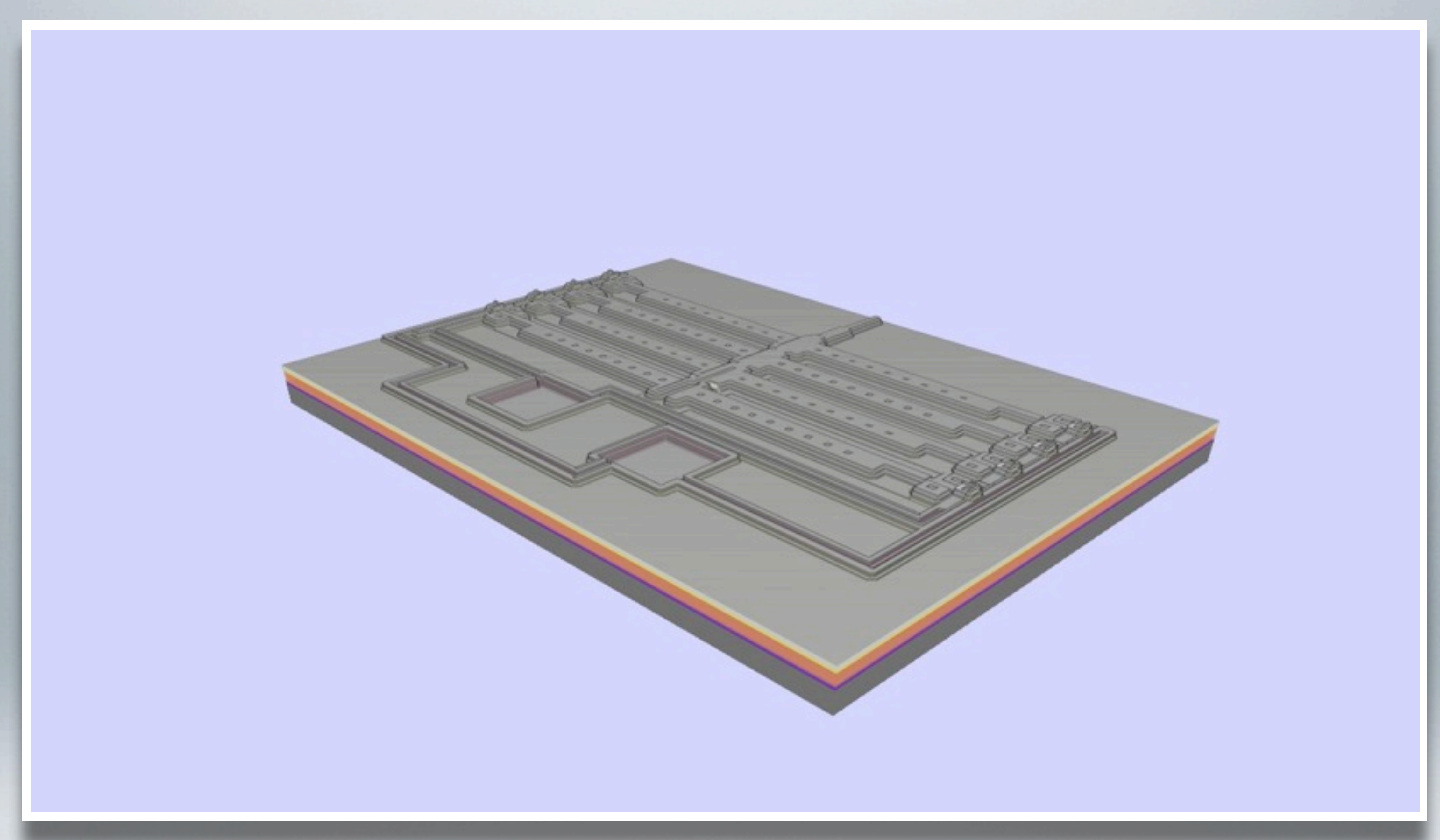
METAL
(GDS#51);Leave Photoresist Outside
Comments:pattern METAL level for Lift-off



30. Etch PR-S3800 Wet (1112A)

Etch Thickness: 500 nm (Etch Through)

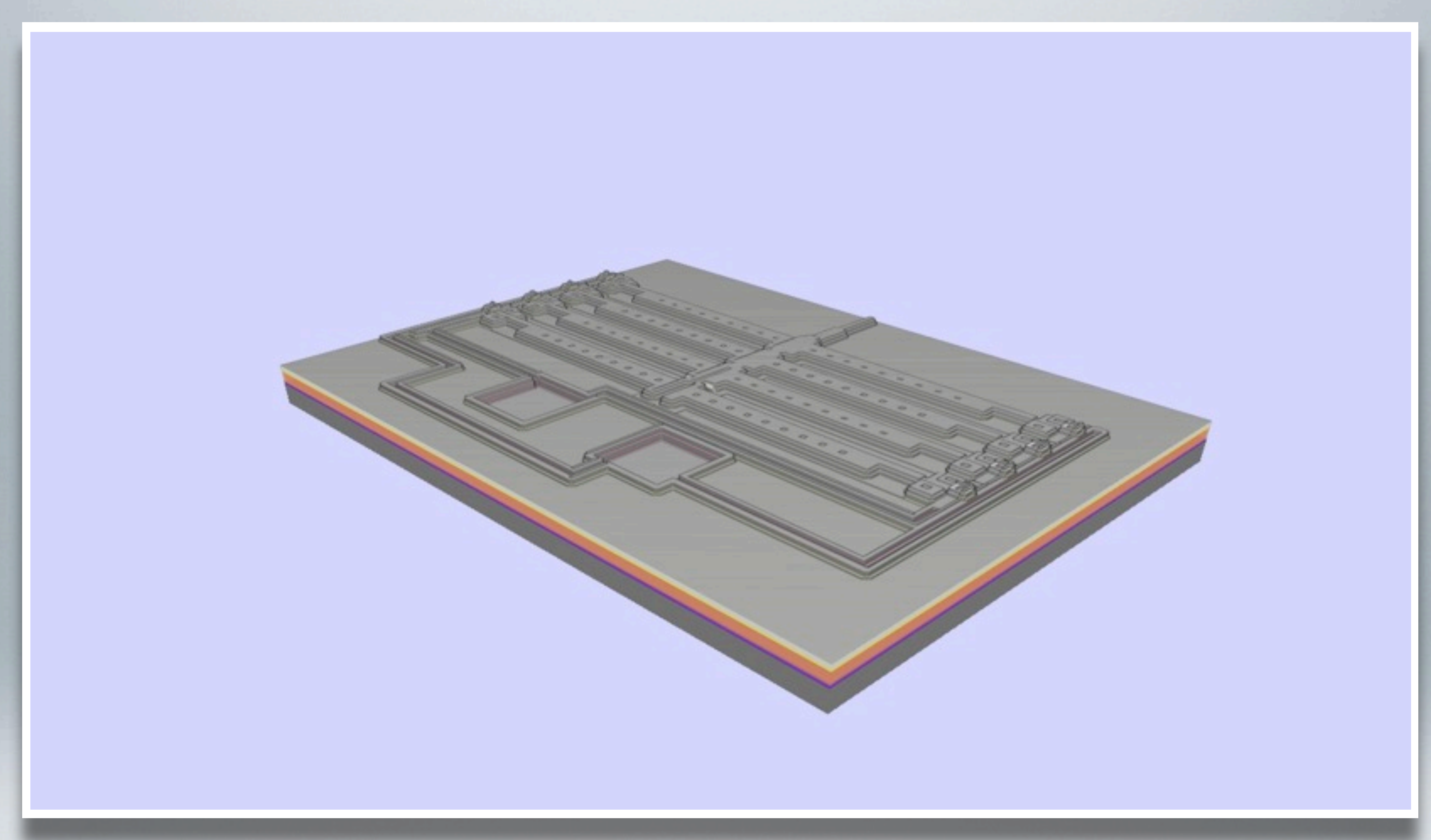
Comments:



31. Deposition Al Sputter (Ar-Ambient)

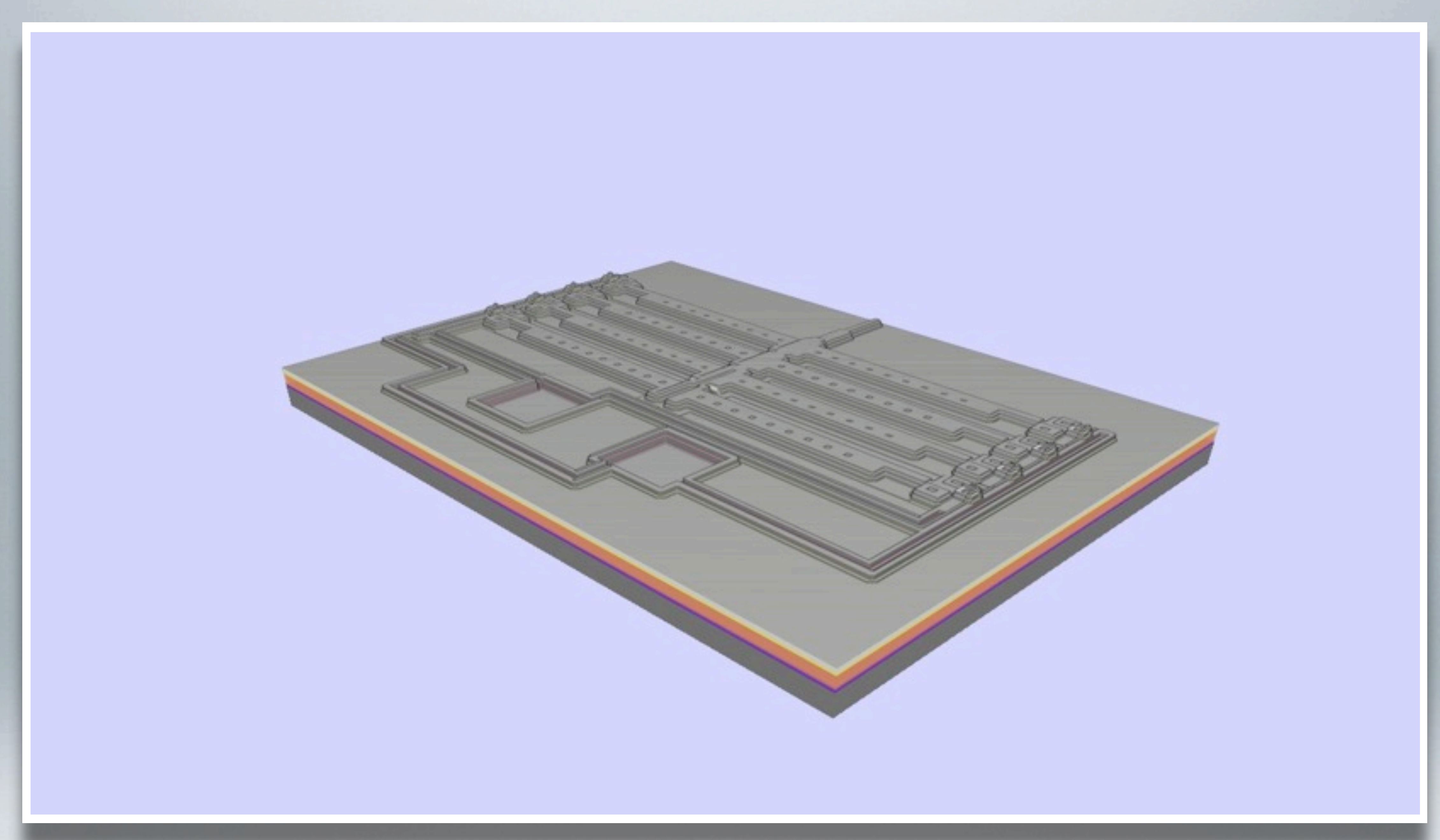
Film Thickness: 1000 nm (Conformal)

Comments:



32. Lithography UV Contact (Suss)

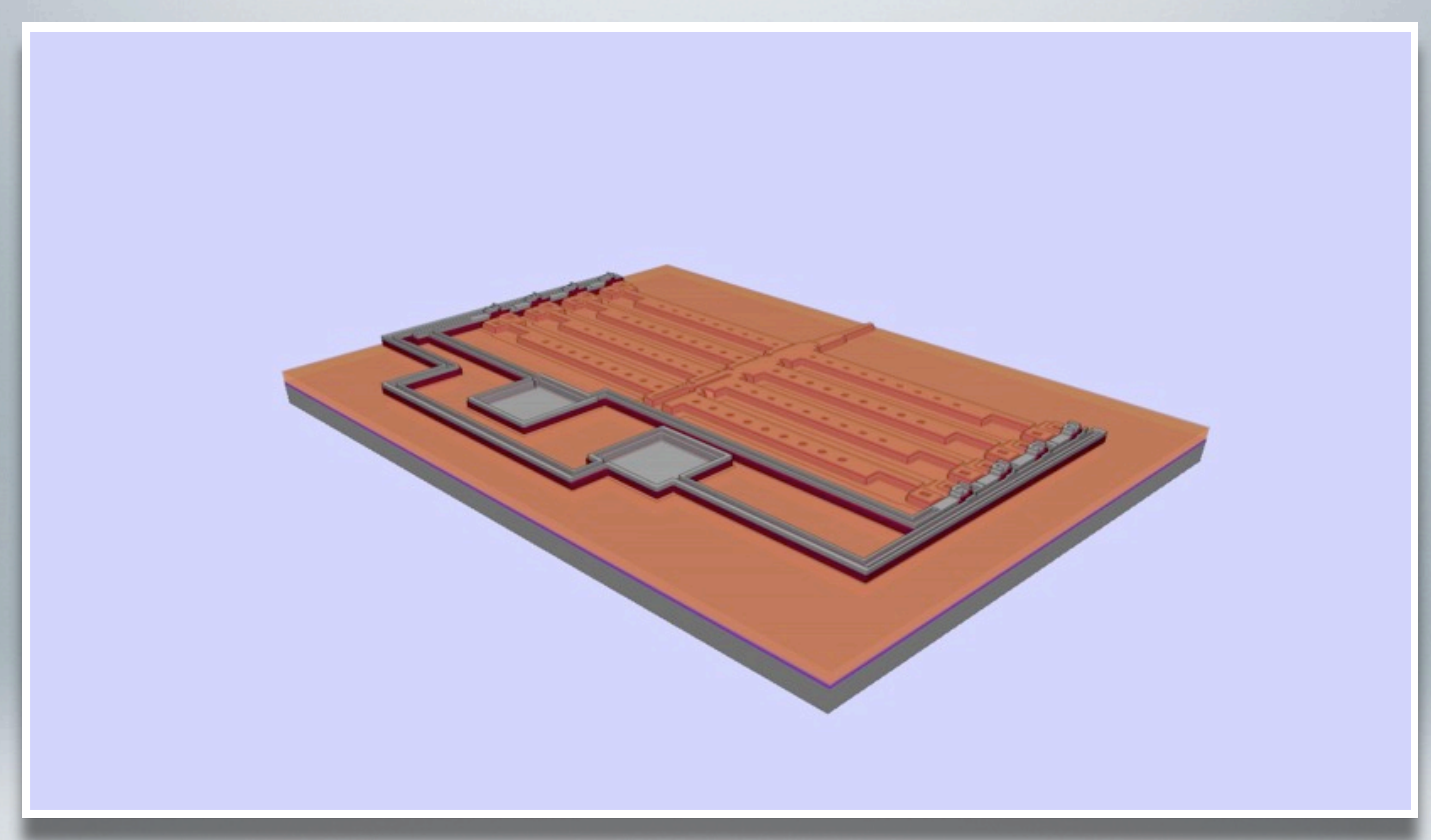
HOLEM
(GDS#48);Leave Photoresist Outside
Comments:pattern HOLES in METAL



33. Etch Al Wet (PAN)

Etch Thickness: 1000 nm (Etch Through)

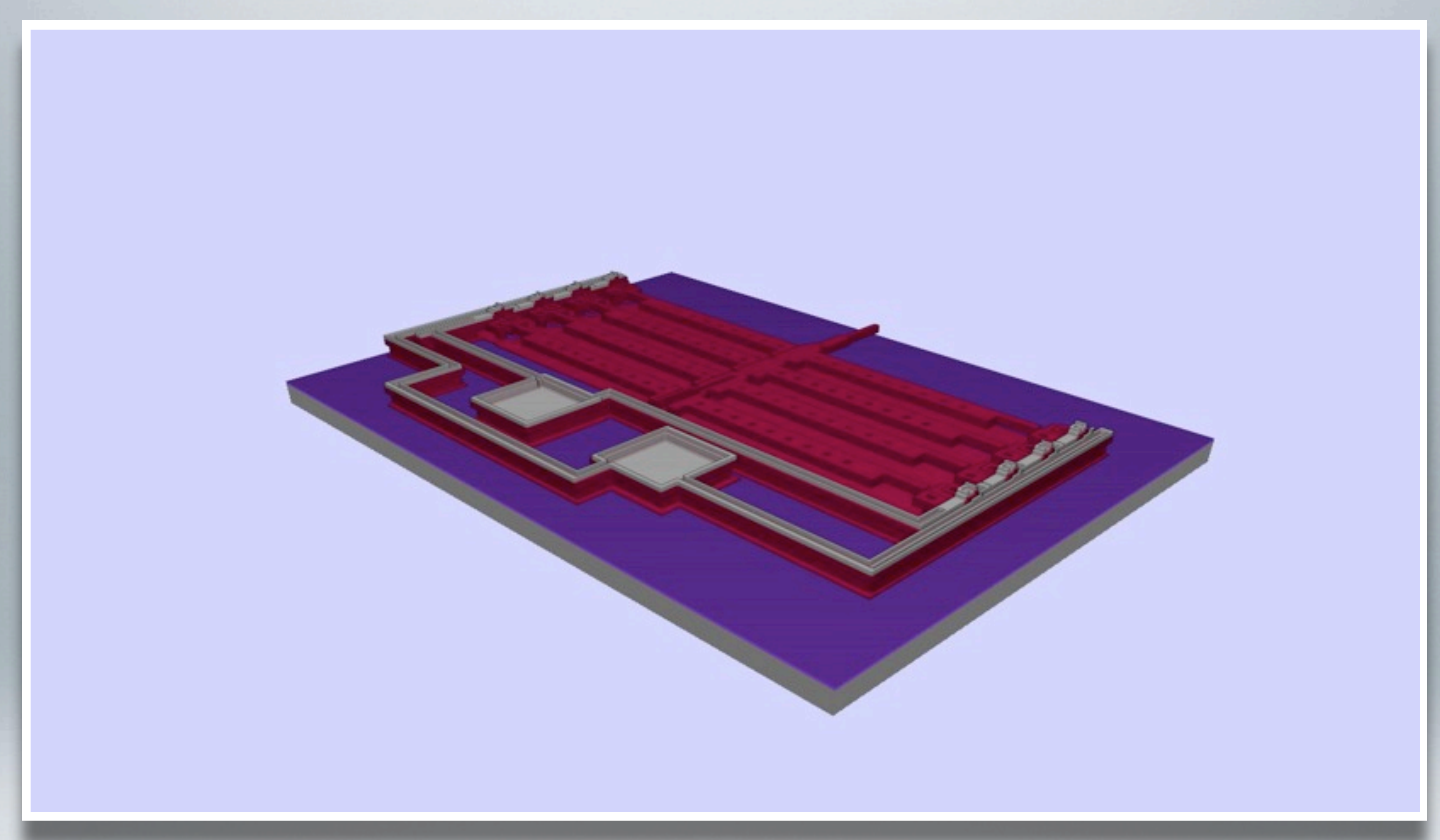
Comments:



34. Etch PR-S3800 Wet (Lift-off)

Etch Thickness: Lift off

Comments:



35. Etch PSG Generic (Generic)

Etch Thickness: Sacrificial Etch

Comments:

Color Key

Material	Step	Transparency	Color
Si3N4	2	194	
PolySi	3	255	
PSG	8	32	
PolySi	13	255	
PSG	18	32	
PolySi	23	255	
PR-S3800	28	128	
Al	31	128	

Summary (1-1)

Lithography: 12 Mask Levels

Layer Name	Layer Number	Side	Leave Photoresist	Comments
POLY0	13	Top	Inside	Pattern ground plane
HOLE0	41	Top	Outside	provide holes for POLY0
DIMPLE	50	Top	Outside	Dimples mask
ANCHOR1	43	Top	Outside	Anchor 1 mask
POLY1	45	Top	Inside	Define POLY1, first structural layer
HOLE1	0	Top	Outside	provide holes for POLY1
POLY1_POLY2_VIA	47	Top	Outside	P1P2VIA, Provide structural via to connect POLY1 and POLY2
ANCHOR2	52	Top	Outside	ANCHOR2: Provide Anchors for second structural POLY

Summary (1-2)

Lithography: 12 Mask Levels

Layer Name	Layer Number	Side	Leave Photoresist	Comments
POLY2	49	Top	Inside	Define second structural level (POLY2)
HOLE2	1	Top	Outside	provide holes for POLY2
METAL	51	Top	Outside	pattern METAL level for Lift-off
HOLEM	48	Top	Outside	pattern HOLES in METAL

Summary (2)

Depositions/Implants: 8

Material	Process	Process ID	Side	Thickness (nm)	Comments
Si3N4	PECVD	Ar	Top	600	
PolySi	LPCVD	SiH4	Top	500	Deposit GND POLY
PSG(Sacrifice)	LPCVD	Generic	Top	2000	First Sacrificial PSG
PolySi	LPCVD	SiH4	Top	2000	Deposition of second poly (POLY1)
PSG(Sacrifice)	Generic	Generic	Top	750	Deposition of second sacrificial PSG
PolySi	LPCVD	SiH4	Top	1500	Deposition of second strucutral POLY (POLY2)
PR-S3800	Spin	S3810	Top	500	
Al	Sputter	Ar-Ambient	Top	1000	

Summary (3-1)

Etches: 14

Material	Process	Process ID	Side	Etch depth (nm)	Comments
PolySi	Dry	SF6-Plasma	Top	500(Etch Through)	
PolySi	Dry	SF6-Plasma	Top	500(Etch Through)	
PSG	Generic	Generic	Top	750(Partial Etch)	
PSG	Generic	Generic	Top	2000(Etch Through)	
PolySi	Dry	SF6-Plasma	Top	2000(Etch Through)	
PolySi	Dry	SF6-Plasma	Top	2000(Etch Through)	
PSG	Generic	Generic	Top	750(Etch Through)	
PSG	Generic	Generic	Top	750(Etch Through)	

Summary (3-2)

Etches: 14

Material	Process	Process ID	Side	Etch depth (nm)	Comments
PolySi	Dry	SF6-Plasma	Both	1500(Etch Through)	
PolySi	Dry	SF6-Plasma	Both	1500(Etch Through)	
PR-S3800	Wet	1112A	Top	500(Etch Through)	
Al	Wet	PAN	Top	1000(Etch Through)	
PR-S3800	Wet	Lift-off	Top	Lift off	
PSG	Generic	Generic	Top	Sacrificial Etch	

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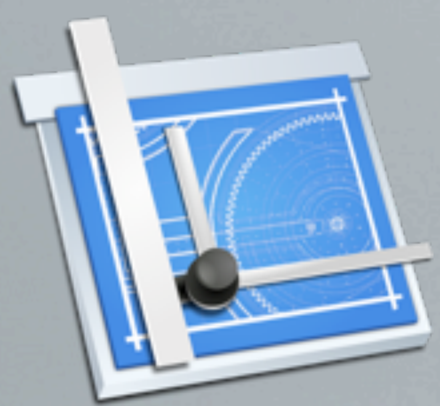

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