IEUVI Mask TWG Roadmap

EUV Mask Improvement Roadmap (draft)

	Alpha (2005)		Beta (2007)		Gamma (2009)	
parameter	specification	comment	specification	comment	specification	comment
Added defects (/cm^2)	0.050	10 defects in max Quality Area (142 mm x 142 mm)	0.010	2 defects in max QA	0.005	1 defect in max QA
Adder rate during handling	per 1 handling operation	trigger level for cleaning operation	per 10 handling operations	trigger level	per 100 handling operations	trigger level
Adder rate during shipping	50% of all masks	trigger level	10% of all masks	trigger level	1% of all masks	trigger level
Adder rate during storage	30 days	trigger level	100 days	trigger level	1 year	trigger level
Max particle (nm, pattern side)	60	limit of metrology	32	ITRS 45nm	22	ITRS 32nm
Max particle (nm, backside)	500 (60)		100 (32)		50 (22)	
Surface flatness (nm P-V, pattern side)	100		70		50	SEMI P37, Class C
Surface flatness (nm P-V, backside)	100		70		50	SEMI P37, Class C
Substrate thickness uniformity (um)	1000 (100)		(50)		(50)	
Surface flatness outside QA (nm, both sides)	1000		500		??	Exclude areas of no interest based on practical designs?
HSRF (nm, within QA)					0.15	SEMI P37
Local slope (mrad)	3.0		2.0		< 1.0	SEMI P37
Maximum Legendre mode	(2,2)		(2,2)		(3,3)	relaxed by HVM
Mask Lifetime		Cumulative exposure energy? Cleaning cycles?				

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Comments

- **“Added Defects” and “Maximum Particle” should be treated as one pair. MBDC has reported that the number of particles increases rapidly as particle size becomes smaller.**
- **“Mask Lifetime” should be added (no values yet available) because EUV masks may need several cleanings and the capping layer may not be mature for illumination of Gamma tool.** ***(Line added to Roadmap.)***

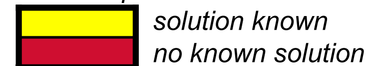
Comments-2

- Add cost-of-ownership.
- Change “substrate thickness variation” to “low order thickness variation”, and clarify.
- Clarify “adder rate during handling”.
- Backside particles should be equivalent to frontside particles; depends on crushing function during clamping.
- Some items may be revised following P37 revisions.
- Adder rate during shipping.

EUV Mask Top Technical Issues List

Issue	Status	Comment
1. Multilayer defectivity (mask blank).		MBDC key issue
2. Metrology / defect inspection (actinic?).		Push existing technology; ebeam option.
3. Handling & protection.		ISMT pursuing carrier; need molecular contamination.
4. Substrate defectivity.		
5. Mask cleaning.		ISMT investigating several options.
6. Mask repair.		
7. Tool throughput.		
8. Mask flatness / thickness variation.		

Status colors per ITRS



solution known
no known solution

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