EUV Mask Technical Session
Panel Discussion #2: Mask Blanks Supplier

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Status of SCHOTT Lithotec: Mask blank performance is on track

SEMATECH EUV Blank Commercial Roadmap Update (Q1'05) *

- Updates made due to supplier performance and understanding issues better
- Supplier performance areas of excellence are diverse

Year / Half / Parameter (Q1 2005 Update)	2003 H1 Pre-a	2003 H2 Pre-a	2004 H1 alpha	2004 H2 alpha	2005 H1 beta	2005 H2 beta	2006 H1 beta	2006 H2 beta	2007 H1 beta	2007 H2 beta	Production 45nm gamma	SL
Mask Substrate												
Material	LTEM	LTEM	LTEM	LTEM	LTEM	LTEM	LTEM	LTEM	LTEM	LTEM	LTEM	
Mean CTE (± ppb/ deg K)	30	30	25	25	20	20	15	15	10	10	± 5	10
CTE Spatial Variation (± ppb/ deg K TIR)	10	10	10	10	8	8	7	7	7	7	6	10
Flatness Front (µm) (P–V)	0.6	0.6	0.5	0.4	0.3	0.25	0.2	0.1	0.075	0.05	0.03	0.07
Flatness Back (µm) (P–V)	1.0	0.8	0.8	0.6	0.5	0.4	0.3	0.2	0.15	0.1	0.05	0.07
Surface Finish												
MSFR (nm rms)	< 2.0	< 2.0	< 1.5	< 1.0	< 1.0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
HSFR (nm rms)	0.25	0.25	0.25	0.20	0.20	0.20	0.20	0.15	0.15	0.15	< 0.15	0.17
Local Slope of Front Surface (mrad)	N.A.	N.A.	≤ 5.0	≤ 5.0	≤ 4.0	≤ 4.0	≤ 3.0	≤ 3.0	≤ 2.0	≤ 2.0	≤ 1.0	2.3
Total Blank Defects												
Total ML Defect Density (defects/cm^2)	2.0	1.0	0.8	0.6	0.4	0.20	0.12	0.08	0.03	0.01	0.003	0.2
Cut-off Size (PSL equivalent, nm)	150	150	120	120	90	90	60	60	40	40	25	90
Multilayer Performance												
Peak Reflectivity (%)	>60	>60	>62	>62	>63	>64	>65	>65	>66	>66	> 67	>64
Peak Reflectivity Unif. (%P-V) Absol.	0.80	0.80	0.70	0.60	0.60	0.55	0.55	0.50	0.50	0.50	0.50	0.6
Median Central λ of Reflectivity (nm)	13.40	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	TBD	
Median Central λ Offset (nm)	± 0.12	± 0.10	± 0.08	± 0.08	± 0.07	± 0.07	± 0.07	± 0.07	± 0.06	± 0.06	≤ ± 0.06	0.05
Centroid Reflected λ Uniformity (nm P-V)	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06

- 3 Suppliers w/ good yield performance (Q4 '04)
- 2 Suppliers w/ good yield performance (Q4 '04)
- 1 Supplier w/ good yield performance (Q4 '04)
- Meet w/ upgraded tooling & process
- New tooling / process needed
- New Tooling & Process innovation needed

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*** Phil Seidel (SPIE Microlithogaphy 2005)**

19

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Path forward of SL

- SL prolonged cooperation with Sematech (MBDC)
- SL cooperates on actinic inspection by EUV PEEM
- Upgrades on Sputter Deposition will be installed beginning 2006

Risk issues

- Multilayer defect density needs to be improved for high throughput, but no showstopper observed
- Multilayer defect mitigation and defect repair
- Potential need for actinic inspection of blanks
- High price of tooling (e.g. defect inspection) and limited quantities of needed blanks endanger improvements needed according to ITRS
- Available tools to be invested for development only, depreciation over existing small volumes not possible
- Volume production will need more expensive toolings
- Lack of standardization / IP competition on absorber and buffer solutions

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