

Breakouts

February 22, 2004

Agenda

8:00		Open
		<i>Mask Handling</i>
8:10	8:35	Mask Fiducial Marks - Pei-yang Yan (Intel)
8:35	9:00	Data Matrix Update - T. White
9:00	9:15	Mask Layout and Handling Areas - T. White
9:15	9:35	ISMT EUV Mask Projects for 2004 - T. White
		<i>Mask Carrier, part 1</i>
9:35	10:00	Results of Carrier Benchmark Study - Jenny Wang (IBM)
10:00	10:25	Alcatel Progress - Magali Davenet (Alcatel)
10:25	10:40	break
		<i>Mask Carrier, part 2</i>
10:40	11:05	New Carrier Materials - T. White
		<i>Mask Blank, part 1</i>
11:05	11:35	4.0mm Thick Substrate Evaluation - Andrew Mikkelson (U.Wisconsin)
11:35	12:00	State of Blanks Development & Thickness Spec - Chris Walton (LLNL)
12:00		lunch
		<i>Mask Blank, part 2</i>
13:00	13:20	Overview of Current Commercially Available Blanks - Jan Cavelaars (ISMT)
13:20	13:45	Electrostatic Chucks - Abid Khan (Invax Technologies)
13:45	14:10	PERIS Inspection Tool - David Adler (KLA-Tencor)
		<i>Standards</i>
14:10	14:40	SEMI Standards Update - Scott Hector (ISMT)
14:40	14:55	Mask Standards Roadmap - Thomas White (ISMT)
14:55	15:10	break
		<i>Mask Cleaning</i>
15:10	15:30	Summary from the ISMT Cleaning Workshop - Abbas Rastegar/T. White (ISMT)
15:30	15:55	State of the Mask Cleaning Art - Ahmed Busnaina (Northeastern U.)
open		(tentative; Brian Grenon may be able to join us, if so we'll fit him in)
16:00	16:30	<i>Breakouts:</i> Metrology, Carrier, open topic
16:30	16:55	Breakout summaries
16:55	17:00	Day summary
17:00		Adjourn

Breakout sessions

- **Count off by 3's.**
- **Group 1 stays here; groups 2, 3 have nearby rooms – Los Altos and Cupertino (rooms, not the towns).**
- **Select a secretary with a laptop (MS Word preferred).**
- **Spend 25 minutes brainstorming: what are the needs, the gaps/showstoppers, industry timing, prioritization, anything.**
- **Last 5 minutes organizing / summarizing themes.**
- **5-10 minute group summaries following (select a presenter).**

30-minute Breakouts

- **Topics:**

- 1: mask related metrology - Santa Clara
- 2: mask carrier strategy - Cupertino
- 3: mask flatness – Los Altos

Breakout Summaries

Metrology breakout

- Physical standards (artifacts)
- Environmental metrology
- CD metrology tool
- Flatness tool for mask & chuck
- Chucking force
- Reflectance metrology – certify center wavelength, no pattern degradation, %refl loss
- Defect inspection – share data, compare performances
- IPD

Mask Flatness breakout - 1

- Discontinue 4 mm thickness study
 - Suggest 4 mm study be discontinued
 - Harder to batch polish to same flatness value
 - Not compatible with existing mask equipment
 - Bends more on three point mounting e-beam
 - Free standing interferometry more difficult
 - If form factor is changed, better to go to thicker substrates and perhaps round not square

Mask Flatness breakout - 2

- Which flatness specs are relevant and over what spatial frequency range?
 - Need to examine front, back and TTV specs as a group
 - Flatness metrology should be added to chucking standard
- Legendre mode specification will be useful
 - Need spec for each Legendre mode
 - Need simulation of Legendre mode flattening at relevant amplitudes (not 1 micron)
 - Determine if response of modes to chucking is orthonormal
 - Simulate effects of patterning on flatness

Mask Handling / Carrier breakout - 1

- Short-term Recommendations
- In general, refine and solidify initial concepts / requirements so that initial prototyping and testing can begin
- 3 main categories:
 - EUV Mask layout / handling zones
 - EUV Mask process handling requirements throughout mask lifetime
 - Carrier contamination control

Mask Handling / Carrier breakout - 2

- EUV Mask Layout / Handling Zones
- Complete detailed definition of EUV Mask layout, exclusion zones, etc. as soon as possible
 - Identify separate 'Pick' vs. 'Nest' handling zones to prevent interference during reticle hand-offs
 - Identify exclusion volumes around handling zones
 - Rapid closure is probably more important than the specific choices

Mask Handling / Carrier breakout - 3

- EUV Mask Process Handling Requirements
- Add further detail to EUV Mask Process Diagram
 - Begin with “ASML process diagram”
 - Add specific details:
 - Identify every potential tool, by name, OEM
 - Identify EUV mask orientation required by each tool
 - Pattern side up/down
 - Angular orientation
 - Pre-alignment requirements
 - Current and/or evolving “chuck” hand-off and placement geometries
 - Identify any additional requirements / assumptions (e.g. support / handling frame(s), and installation thereof)
 - “Walk” a mask through the entire process to identify process holes, etc.
 - Need additional steps, e.g. flips, rotations, etc.?
 - Need additional hardware, e.g. pre-alignment mechanisms, flippers, etc.?

Mask Handling / Carrier breakout - 4

- EUV Mask Contamination Mitigation
- Identify candidate contamination mitigation schemes
 - Active and Passive
 - Identify approximate support requirements
 - “Real-estate” requirements
 - Interface requirements
 - Power?
 - Communication?
 - Periodic Maintenance and / or cleaning?
 - Straw-man requirements can then help guide carrier standards efforts:
 - Choice of standard size carrier, or mix of 150 / 200mm in fab / mask shop?
 - Reserve areas for mitigation scheme footprint(s)
 - Reserve areas for interface facilities