

SEMATECH SURVEY RESPONSE



Survey Overview

□ Purpose

- ❖ Obtain an industry perspective on areas to standardize in EUV reticle handling
- ❖ Guide formation of Industry Standards WGs.
- ❖ Help drive a common industry solution for EUV reticle handling

□ Survey Format

- ❖ Questions sent to 20+ companies
- ❖ 13 responses received – end users, exposure tool suppliers, mask carrier suppliers, substrate/mask suppliers, inspection supplier
- ❖ Questions covered three areas – protective enclosure, contact points, and carrier

Question 1.1

- If we need to use a protective enclosure of some form such as the removable EUV pellicle, are there any concerns/constraints related to mask processing?
 - ❖ We assume that the mask is finally cleaned at mask houses, which is currently carried out for any of optical masks, before pellicles are put. We then set this mask in a protective enclosure. We plan to only open this enclosure in exposure tools.
 - ❖ Given this, the main effect of the protection solution on mask processing is to devise a method to mount the mask in a frame or other holder/carrier without adding defects. The mounted mask will have to be inspected at the mask shop in the frame as well. Therefore, the inspection tool will probably have to be modified to handle the mask frame.
 - ❖ It is suitable to attach it to a mask before final inspection is performed on a mask shop, and detach it from a mask in an exposure tool. Probably IC manufacturers do not handle it directly. A transparent removable pellicle is preferable for inspection
 - ❖ The pellicle should be compatible with the existing RSP200 pod. If internal changes to the dome of the RSP it should be compatible for use without the pellicle for non EUV work
 - ❖ Yes, it should be compatible with vacuum operation.
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Question 1.2

- Will it be used on one or both sides of the mask?
 - ❖ Both sides – 3
 - ❖ At least 1 side and maybe both – 4
 - ❖ One side only – 3
 - ❖ Other answers – 3

Question 1.3

- Do you have any protective enclosure ideas? If yes, then do you have data on its effectiveness? If not when do you plan to have the data available for shipping, handling? And can you share more information and also fill in Q 1.5?
 - ❖ Yes – 4 (June, Sept, no date 2005)
 - ❖ No – 9

Question 2.3

- Will you require a film on the sides of the mask? If yes, explain the purpose of the film. (e.g. for contact point, for providing conductive path etc)
 - ❖ Yes – 5
 - ❖ No – 5
 - ❖ No Answer – 3

 - ❖ Yes, for providing conductive path.
 - ❖ A conductive film is required on the front and back sides of the mask. Electrically connecting the front and back may have an effect on e-beam writing.
 - ❖ No. The film on the sides of the mask may cause particle defects.

Question 3.1

- Do you prefer the mask carrier to use one of the existing SEMI interface standards for example for RSP150, RSP200, FOUP? Indicate which one and explain why?
 - ❖ RSP200 format – 5
 - ❖ RSP150 format – 2
 - ❖ FOUP format – 1
 - ❖ New EUV format – 5

 - ❖ RSP200 because it is about a required size.
 - ❖ The RSP150 format is preferred for wafer fabs since the RSP 150 has a smaller footprint, reducing reticle stocker size.
 - ❖ YES, Many of our process tools have RSP200 loaders for their I/O. We would like to maintain compatibility with our existing toolset and investment

Question 3.3

- Do you see the need for the same carrier to be used for shipping and for storage and handling in the fab? Explain why?
 - ❖ Yes – 10
 - ❖ No Answer – 2
 - ❖ No – 1

 - ❖ Yes, in order to reduce contamination risks and handling complexity (e.g. ultra-clean mini-environments required for change of carrier in fab).
 - ❖ Using the same carrier for shipment would protect the integrity of the reticle with the removable pellicle. It would be advantageous for the fab to keep the reticles in the same carrier until they are ready for use
 - ❖ Yes, preferable to minimize transfers between carriers
 - ❖ It needs not to be the same carrier. We use a transfer machine case by case.

Question 3.4

- Do you see the need for the carrier to be able to operate in vacuum and at atmosphere? Explain why?
 - ❖ Atmosphere only - 8
 - ❖ Both – 3
 - ❖ No answer – 2

 - ❖ If we need one carrier from shipping to storage in an exposure tool, it must be able to operate in vacuum and at atmosphere.
 - ❖ By our concept, only a protective enclosure goes into vacuum. Thus, no need.
 - ❖ We do not see a need for the carrier to operate in vacuum. The pellicle should protect the topside, and there is a purge port on the RSP200 for inert gas purging.
 - ❖ Use of vacuum carrier between 2 vacuum steps avoids mask venting and pump down which are steps with higher risk to generate particles and to generate turbulences

QUESTIONS??

