EUV Mask Handling

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DNP

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  - Use Dual Pod from blank to FAB
- Issue and Discussion
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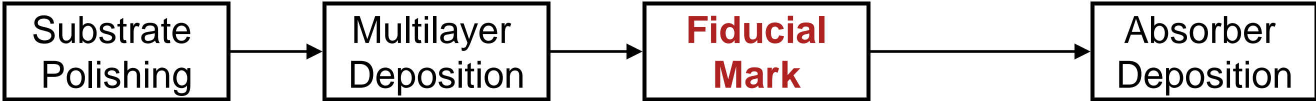
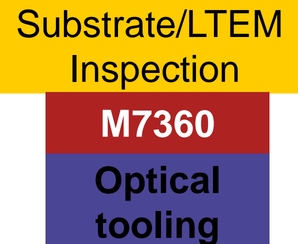
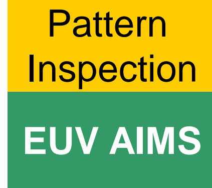
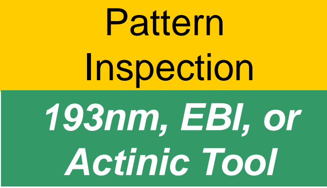
Mask Fabrication Process & Required Inspection Tooling









Kearney, et al 2009 EMLC

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SEMI Draft Document 4466B: "*Mechanical Specification of EUV Pod For 150 mm EUVL Reticles*"

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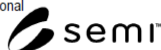


DRAFT
Document Number: 4466B
Date: 1/9/2009

SEMI Draft Document 4466B
NEW STANDARD: MECHANICAL SPECIFICATION OF EUV POD FOR 150mm EUVL RETICLES

1 Purpose

1.1 This standard specifies EUV Pod for the 150 mm Extreme Ultraviolet Lithography (EUVL) reticle, used to ship, transport and store a 6-inch reticle. The EUV Pod consists of an outer pod and a protective inner pod. The EUV Pod is to be used when a conventional reticle carrier does not meet the requirements of EUVL.

2 Scope

2.1 This standard is intended to set an appropriate level of specification that places minimal limits on innovation while ensuring modularity and their inter-changeability at all mechanical interfaces. Many requirements given in this specification are in the form of maximum or minimum dimensions with very few required surfaces. No material requirements or micro-contamination limits are given in this specification.

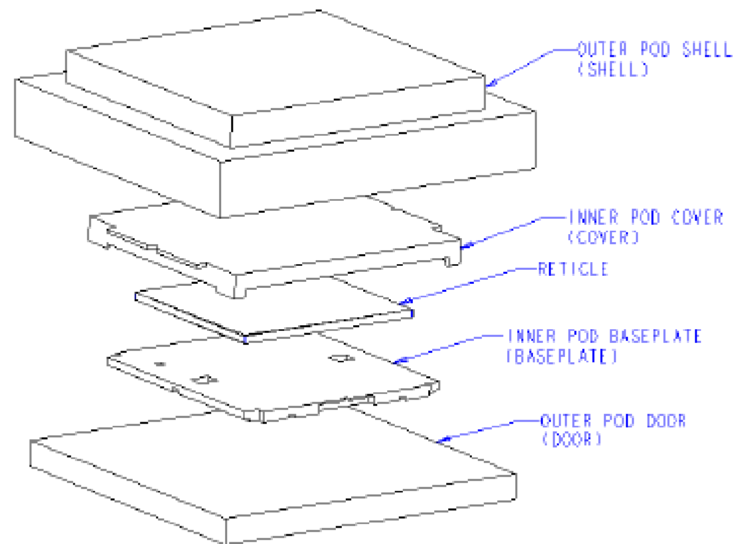
2.2 Because of high attenuation feature of EUV light, a conventional pellicle film cannot be placed in front of EUVL reticles. The inner pod is to protect reticles from particle contamination.

2.3 The EUV Pod has the following components and sub-components. The baseplate of inner pod has two possible configurations depending on the intended usage. They are designated Type A and Type B. Detail configuration requirements for each are shown in Table 2.

Key:
Required feature: ▪
Optional feature: ◊

LETTER (YELLOW) BALLOT

SEMI Draft Document 4466B



SEMI 4466 carrier concept

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Dual Pod features / Outer & Inner

*** EUV reticle pod courtesy of Entegris, Inc.**

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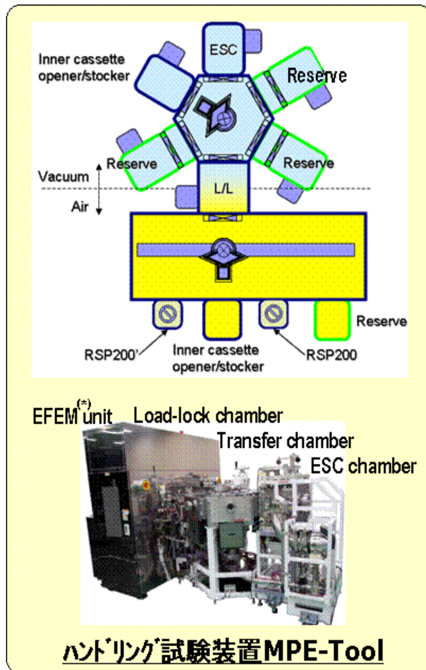
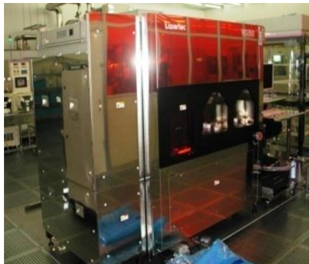
EUVL mask handling / storage technology development at Selete



(*) Equipment Front End Module



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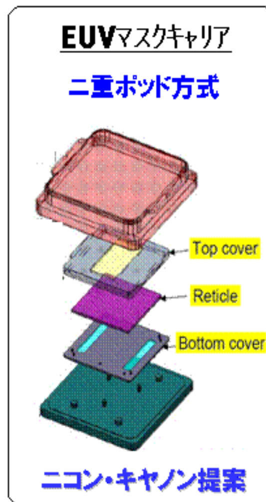

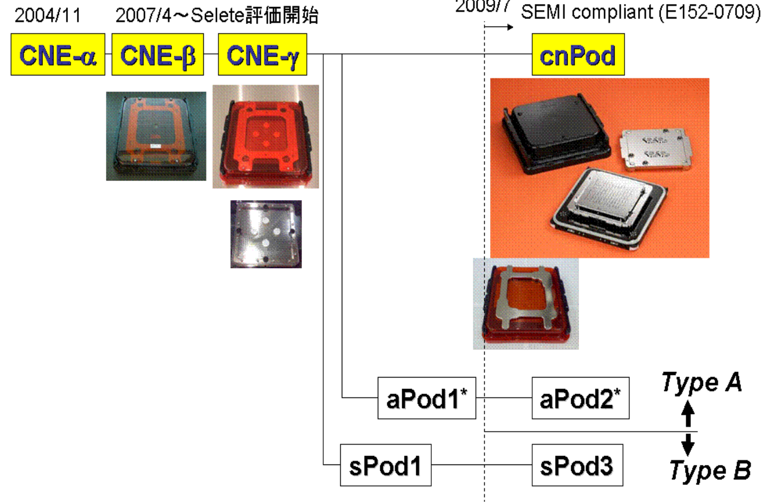

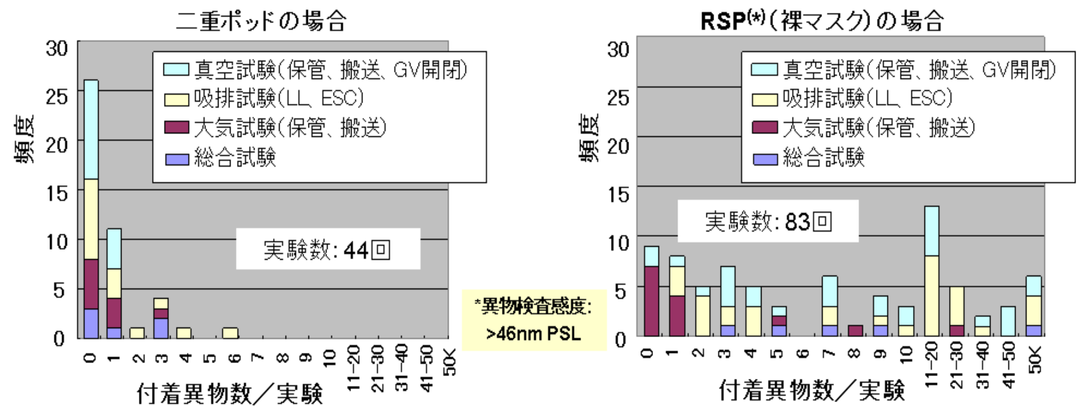

➢Adder with Dual Pod < 0.004 / handling

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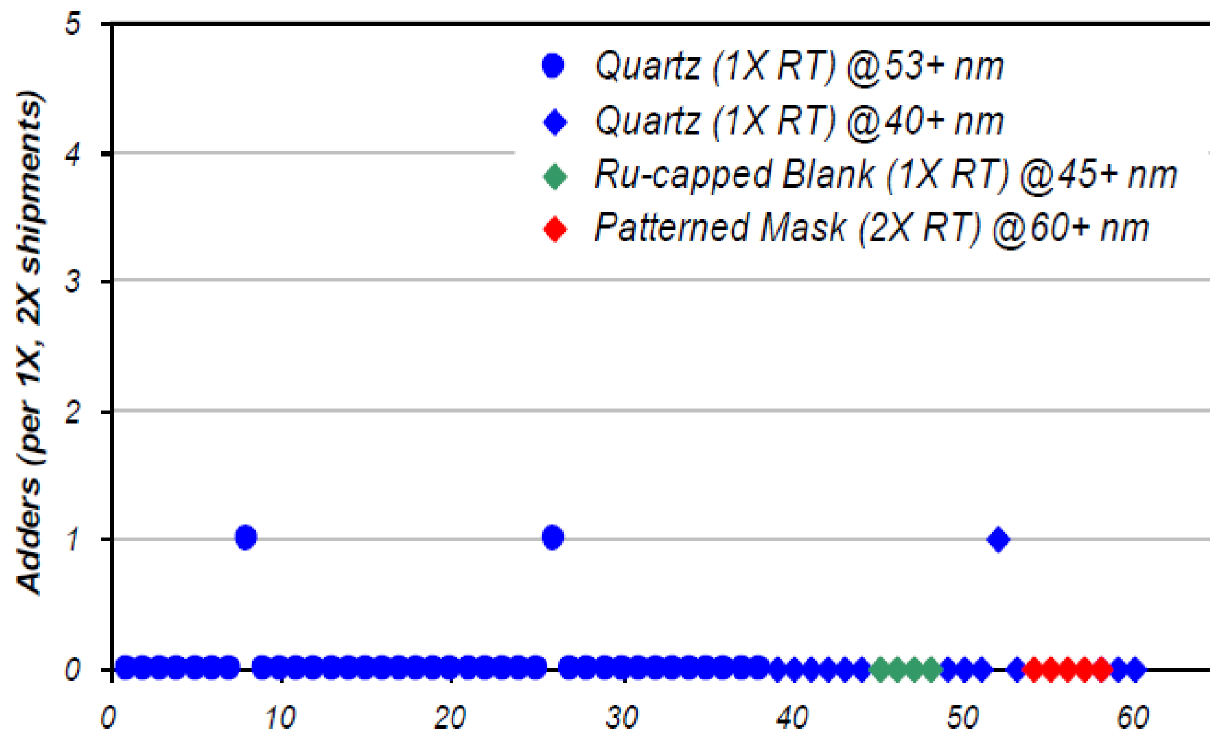
Evaluation of EUVL mask shipping with Dual Pod at SEMATECH

sPod shipping summary

1. All sPod data, including both SEMATECH and Intel data
2. Same data were published in public.



5 September 2011

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Issue and Discussion

- Technical Issue
  - There are still some risk of adder.
  - Dual Pod is not designed for shipping without very critical packaging specifications.
- Cost Issue
  - Use and maintain Dual Pod in maskshop and mask shipping will heavily increase EUV mask cost.
- Discussion
  - There will be frequent mask cleaning and re-qualification in FAB, anyway.

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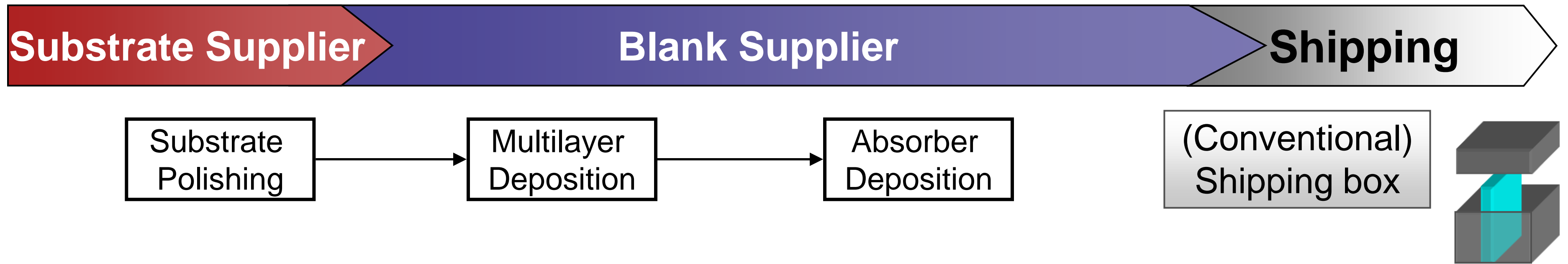
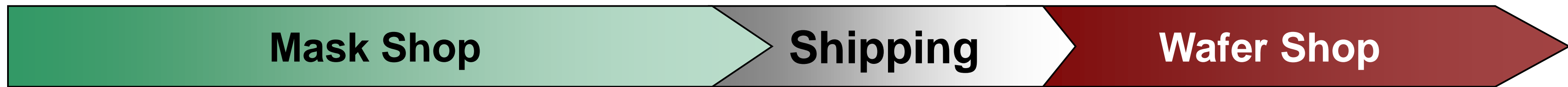
Proposed EUV mask handling flow





SMIF pod

(Conventional) Shipping case

Dual pod

Transfer in SMIF pod → Cleaning / Coat → Inspection

E-beam Writing → Dry Etch → Inspection Repair → Cleaning

Top cover

Reticle

Transfer in Dual pod → Cleaning → Wafer printing

Storage

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Summary

- Dual Pod is most clean EUV mask handling tool.
- However, there will be some risk of particle adder when shipping.
- Using Dual Pod during whole EUV mask manufacturing flow will add serious cost on the mask. So that, mask maker would like to use current SMIF Pod and shipping box in production line and shipping.
- Solution will be usage of Dual Pod in FAB for handling during exposure, mask cleaning, re-qualification, and storage.

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Thank you

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