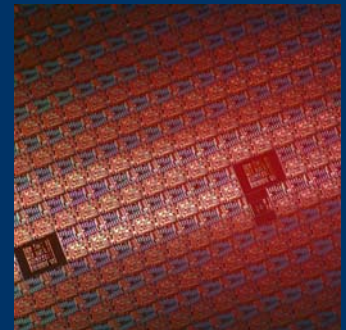




Resist Outgassing Working Group Introduction

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Scope of Working Group



Purpose

- A forum to discuss issues related to testing methods of resist outgassing, understand the risks of resist outgassing, and drive consensus within the community.

Goals

- Standardize testing methods to achieve a common accepted testing methodology using best known/determined practices
- Drive consensus among tool manufacturers to a common metric and test method for resist outgassing
- Confirm or dismiss the risks of outgassing resist as a contributor to optics contamination
 - Identify the materials from the resist that cause contamination



Contributors



Tool Manufacturers

- **ASML** **Noreen Harned**
- **Canon** **Akira Miyake**
- **Nikon** **Takashi Aoki**

Resources

- **CNSE** **Greg Denbeaux**
- **IMEC** **Ivan Pollentier**
- **NIST** **Charles Tarrío**
Thomas Lucatorto
Shannon Hill
- **SELETE** **Iwao Nishiyama**
- **SEMATECH** **Emil Piscani**
Jacque Georger



Resist Outgassing Concerns



for MET Tools

- **Outgassing not a concern for these low power, low WPH tools**
- **Replacement of illuminator optics has been enough to restore power to the wafer, no degradation of the PO has been noted**

for HVM Tools

- **For overall optics contamination, there are potential sources from both hardware and resist**
 - **hardware outgassing may diminish over time (but repairs)**
 - **resist is a continuous source of outgassing (100WPH)**
- **Increased intensity throughout system increases risk of species conversion to carbonaceous layers**



Resist Outgassing Specifications



ASML

- **2E14 molecules/(cm²sec) for hydrocarbons >45AMU for ADT access**
- **Incident wafer plane power of 10mW/cm² for the ADT**

Canon/Nikon

- **3E13 molecules/(cm²sec) for hydrocarbons >45AMU**
- **Incident wafer plane power of 600mW/cm² for HVM**
- **Resist is ~10% contribution of total outgassing budget**

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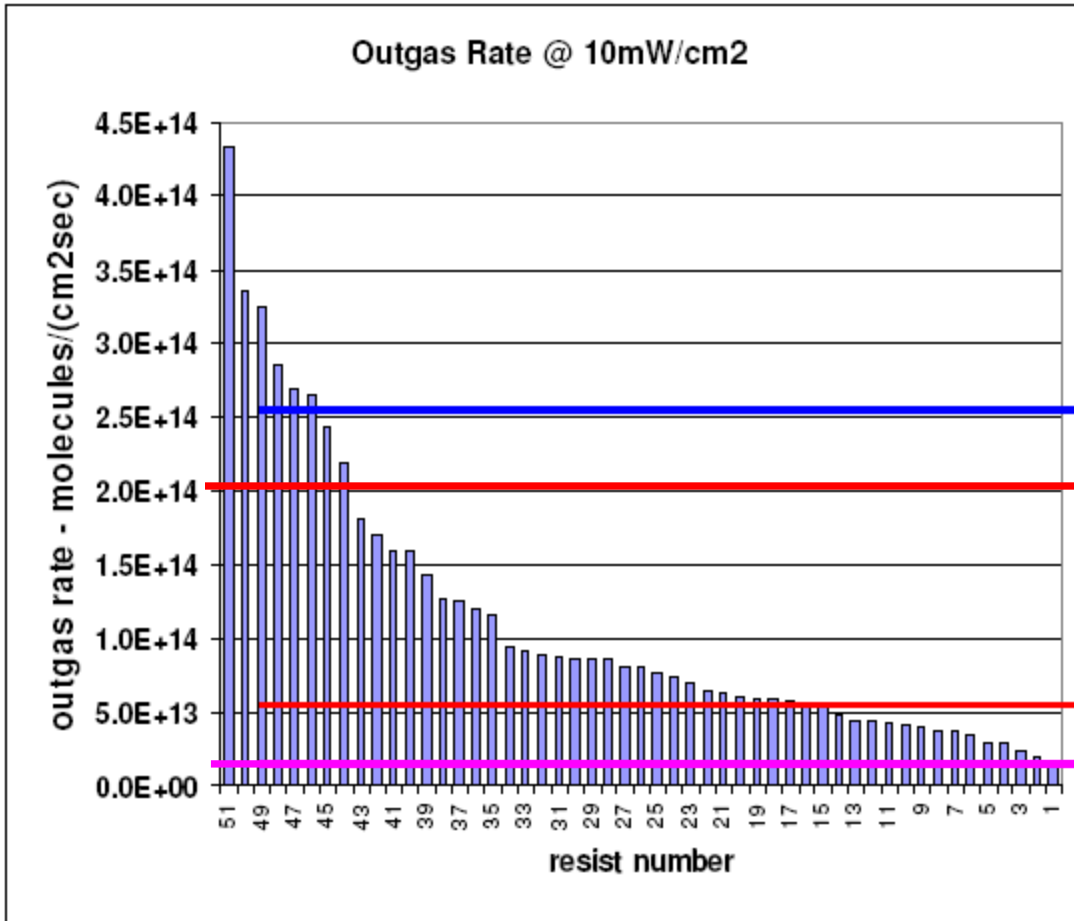
- **6.5E14 molecules/(cm²sec)**



Resist Outgassing Specifications



2E15
(10mW/cm²)



SEMATECH spec
converted to rate based
upon 10 mW/cm² power
level of Alpha/Beta tools

SEMATECH
2007 spec

2E14
(10mW/cm²)

ASML
original spec

3E13
(600mW/cm²)

Nikon
original spec

Orvek, TWG, 2008

Resist TWG Guidance



- Continue cycles of learning in resist and materials development to address challenges of RLS to achieve Z parameter (nZ_{32}) targets
- At this time, outgassing should not be a primary concern for resist development
 - MET tools will support material development
 - best performing materials may be overlooked



Thank you



Thank you for your attention!

