Update from More Moore

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High resolution and low LER EUV resist

More Moore Partners for Resist evaluation

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Specific objectives

High resolution and low LER EUV resist for 22 nm node

1. Characterize and understand the limiting parameters of CAR resist for high resolution
   (CNRS,IMEL, ELETTRA))

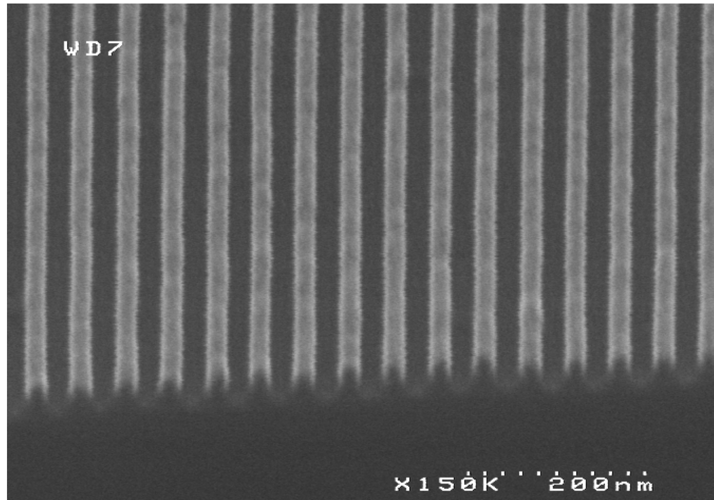
2. Evaluate the resolution limit of existing resist.
   (AZ, CEA-LETI)

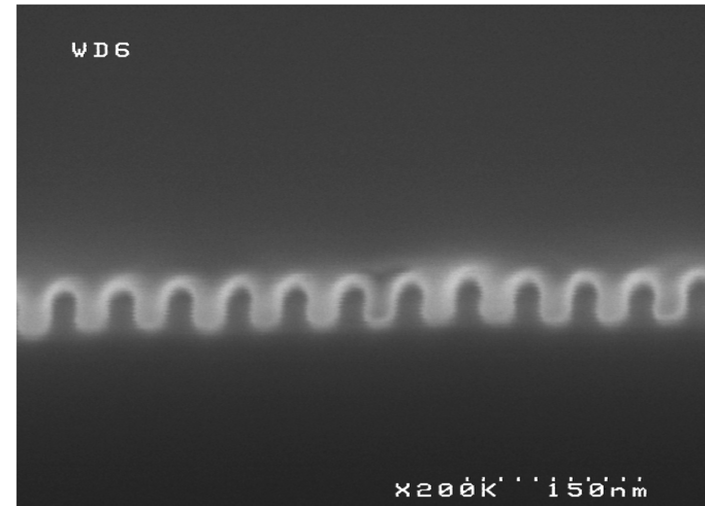
3. Understand the formation of Line Edge Roughness and evaluate the impacts on device / propose LER quantification methods.
   (IMEC, TNO, IMEL)

EUVL
EXTREME ULTRAVIOLET LITHOGRAPHY

EUV-IL exposures of PMMA

25/25 nm dense lines

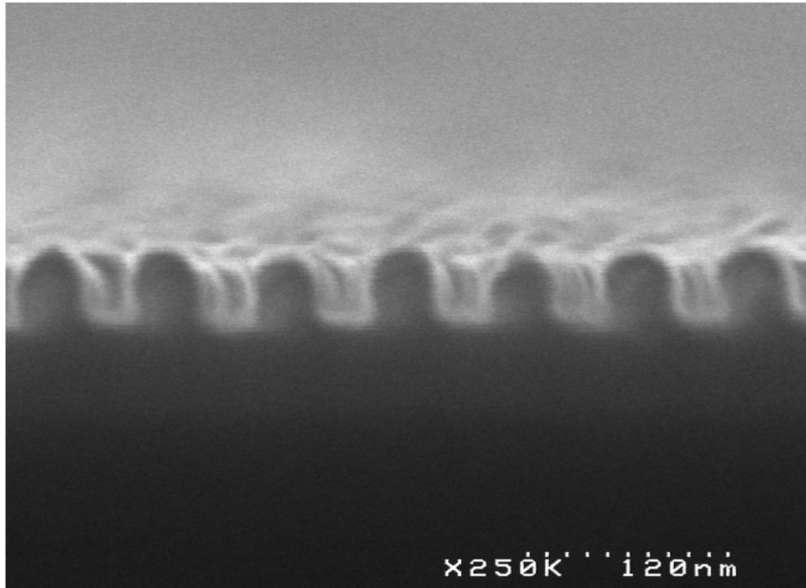


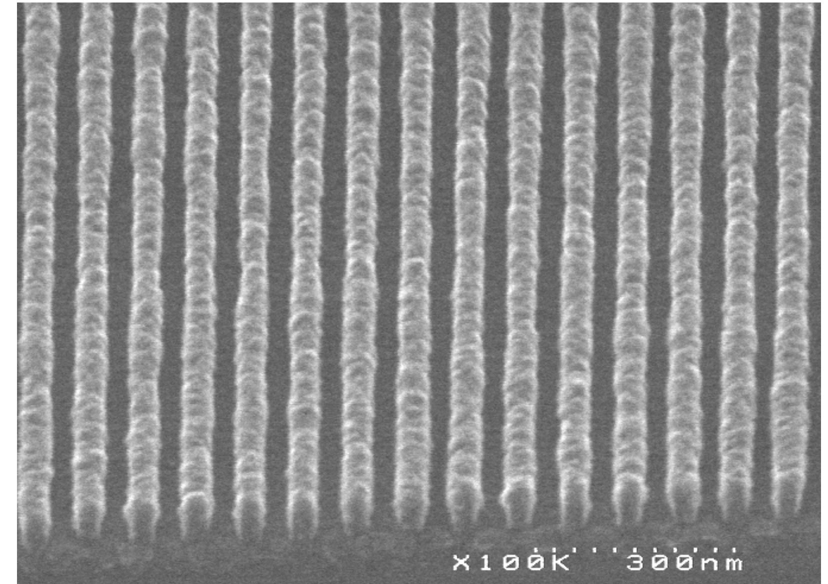


LER= 2nm

Best achieved results on CAR

cea leti





Film thickness 55 nm. Resolution 32.5 nm dense lines.

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Resist More Moore Status

- Test equipment and test procedures for EUV resist materials in place for:
  - Tg
  - outgassing
  - LER measurement

- Simulation programs installed or in progress for modeling thin resist film coating, LER of resist and effects on device performance (etching, interconnects), secondary electron scattering, diffusion of sensitizer

- In Europe EUV lithography is possible with interference lithography at PSI and E-Beam both tools allowing 22 nm L/S.

Conclusions

- 32.5 nm resolution was reached by CAR resist which give hope that CAR could be pushed for the 32 nm node
- But we don’t expect CAR could reached resolution and LER for the 22nm node.
- Research on „New“ resist is necessary, e.g. molecular glass resist
- The main activity in More Moore will be focused on new resist.

Feedback on the ITWG resist consortia cooperation proposal

Serge Tedesco CEA-LETI

Model for Node 32 nm

For EUV introduction at the 32 nm node resist type will be probably CAR

We need to address:

- Optimization (Resolution, LER, Sensitivity, outgassing)
- Process development
- Integration issues
- CoO

The exposure tools should be:

- Small field (2005-2006) available in US and Japan
- Full field (2006-2007) available in Europe and US

➔These tools need to be compatible with the 32 nm node in term of resolution !!

To accelerate, the tool access should be "OPEN" for:

- resists suppliers
- End user's
- Institutes/consortia

Model for Node 22 nm

For EUV introduction or to prepare the 22 nm node resist type is not today defined and could be a showstopper

We need to address and accelerate fundamental resist development (new resist platform ?)

Because of the required resolution the only exposure tools are:

- Interferometer
- E-Beam lithography

The tool access should be "OPEN" for:

- resists suppliers
- Institutes/consortia
- Basic research lab

What means: tool access "OPEN"

Having tool access for resist development is a priority to accelerate,

but each region need to define its model:

- What tools are open and where ?
- Who will have access?
- Timing and slots?
- Access cost ?
- Funding model?

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How to « encourage » resist suppliers ?

By providing them with:

- Tool access
- Agreement on targets and specifications (to be pursued
- EUV lithography insertion node and year agreement
- Mutual feed back on resist evaluation → during review type meetings
- Funding

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