Accelerating the next technology revolution

Oct 2013 Resist TWG

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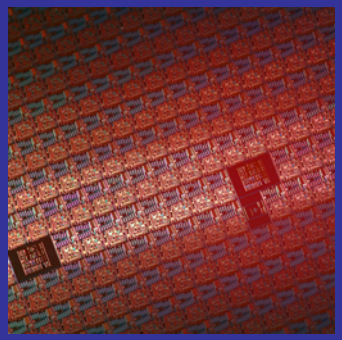

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Housekeeping

- Welcome to the IEUVI Resist TWG meeting

- Please sign in
- Please pick up your name tag. If one doesn't exist, please use one of the blank tags, and add your name and the company you work for
- At the end of the meeting, please return the name tags
- We would like this to be an interactive meeting. Please feel free to ask questions and make suggestions.
- All meeting presentations will be made available on the IEUVI web site after the meeting

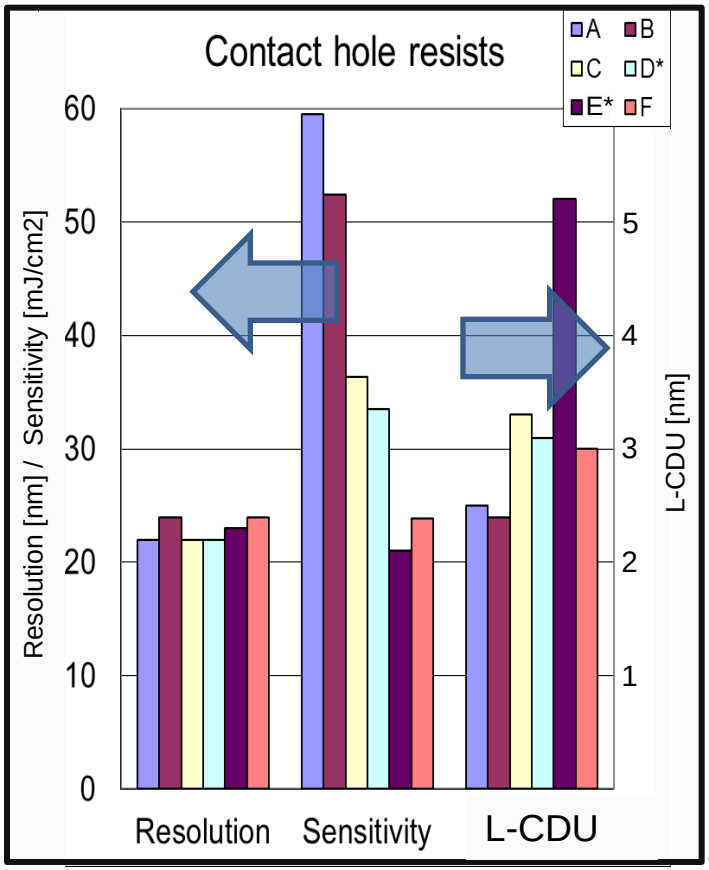
Introduction

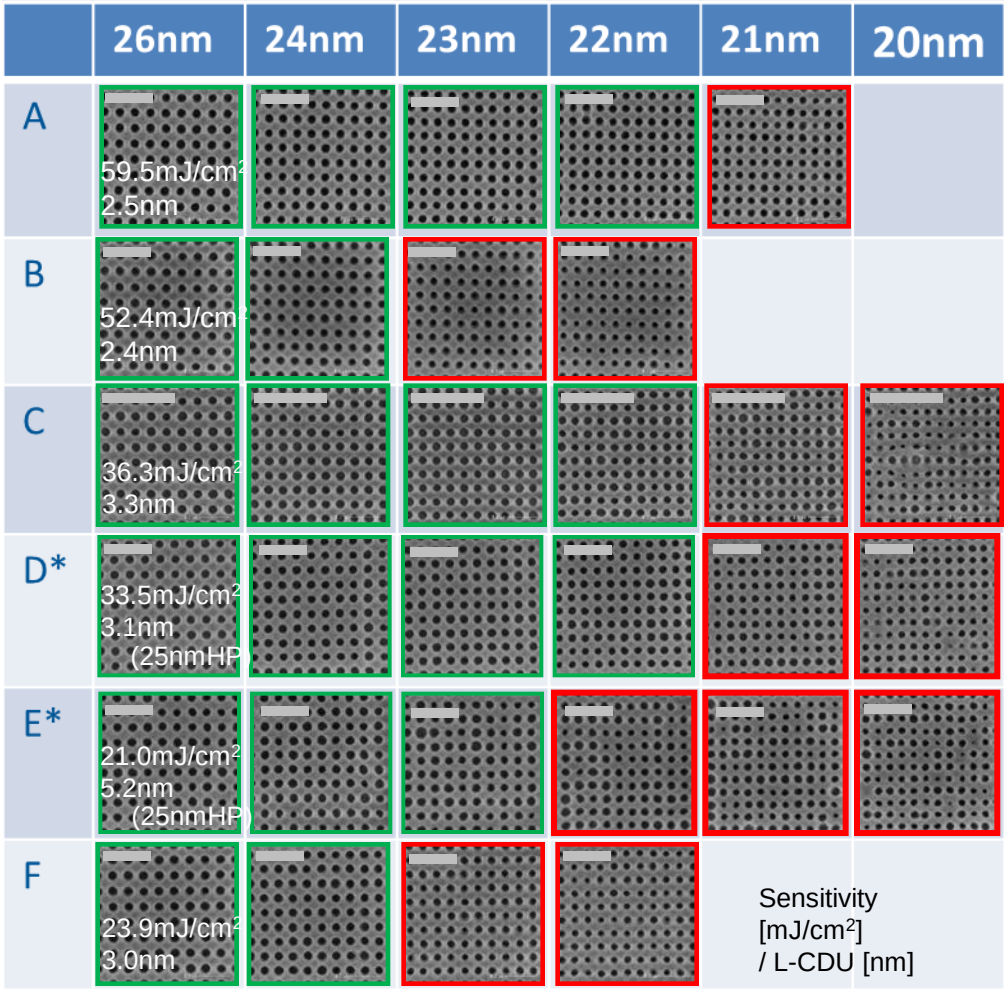
- **Resolution and Sensitivity are improving**
  - Resist vendors are now demonstrating **15 - 16nm hp** resolution with CAR on all EUV Micro Exposure Tools
  - Preliminary results from the NXE3300 are starting to become available
- **LWR and pattern collapse need improvement**
  - Current materials are have not met the LWR target
    - Many materials at ~3nm, target is <2nm
  - LWR improvement belongs to both litho and pattern transfer
    - Looking for an integrated solution to get to the target level
- **Contact hole imaging is a focus item**
  - Materials showing resolution in the 22 – 24nm hp range
  - Improving Local CDU is very important
    - Trends show L-CDU improves as sensitivity decreases

- **Outgassing**
  - Major issue limiting materials research and development
    - Testing availability is improving, but is not at required capacity
    - Ability to research topics related to outgassing is becoming available
- **Interest in DSA as a means to compliment traditional lithography**

Contact hole imaging on the LBNL MET tool

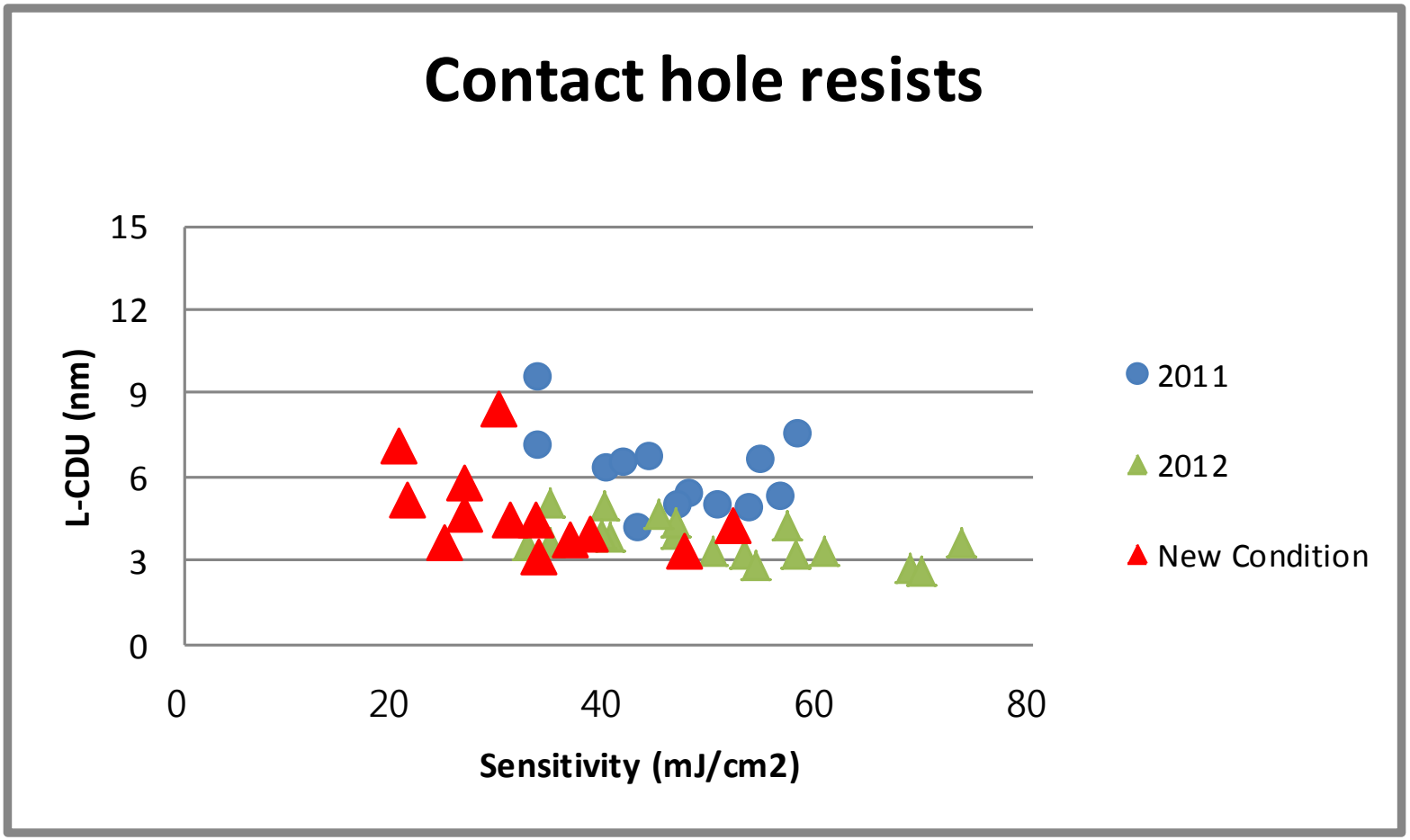
Berkeley MET
Quad, NA 0.3, sigma 0.48~0.68
FT 80nm, * 60nm
Underlayers
No mask bias, * (+20% Bias)





* L-CDU was measured at 26 or 25nm HP

Contact hole resist progress and trends

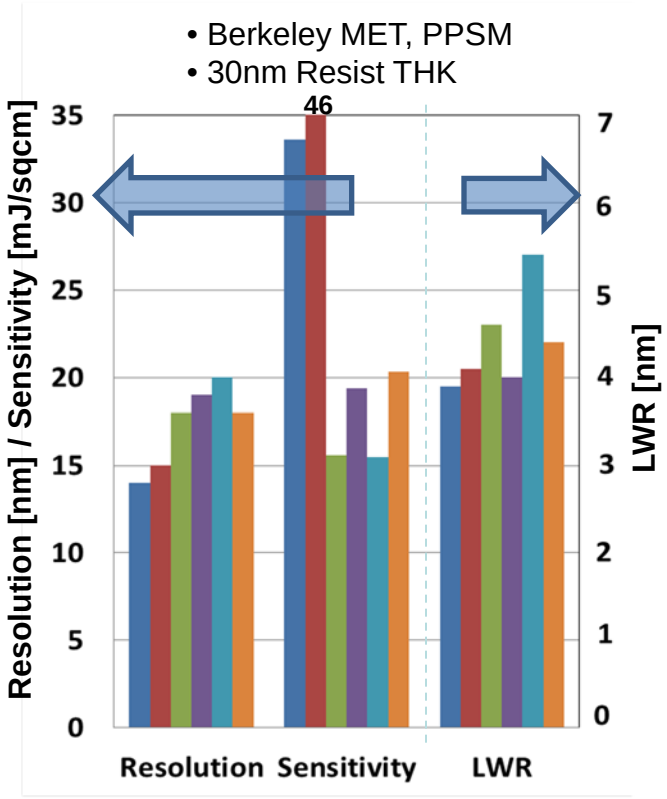


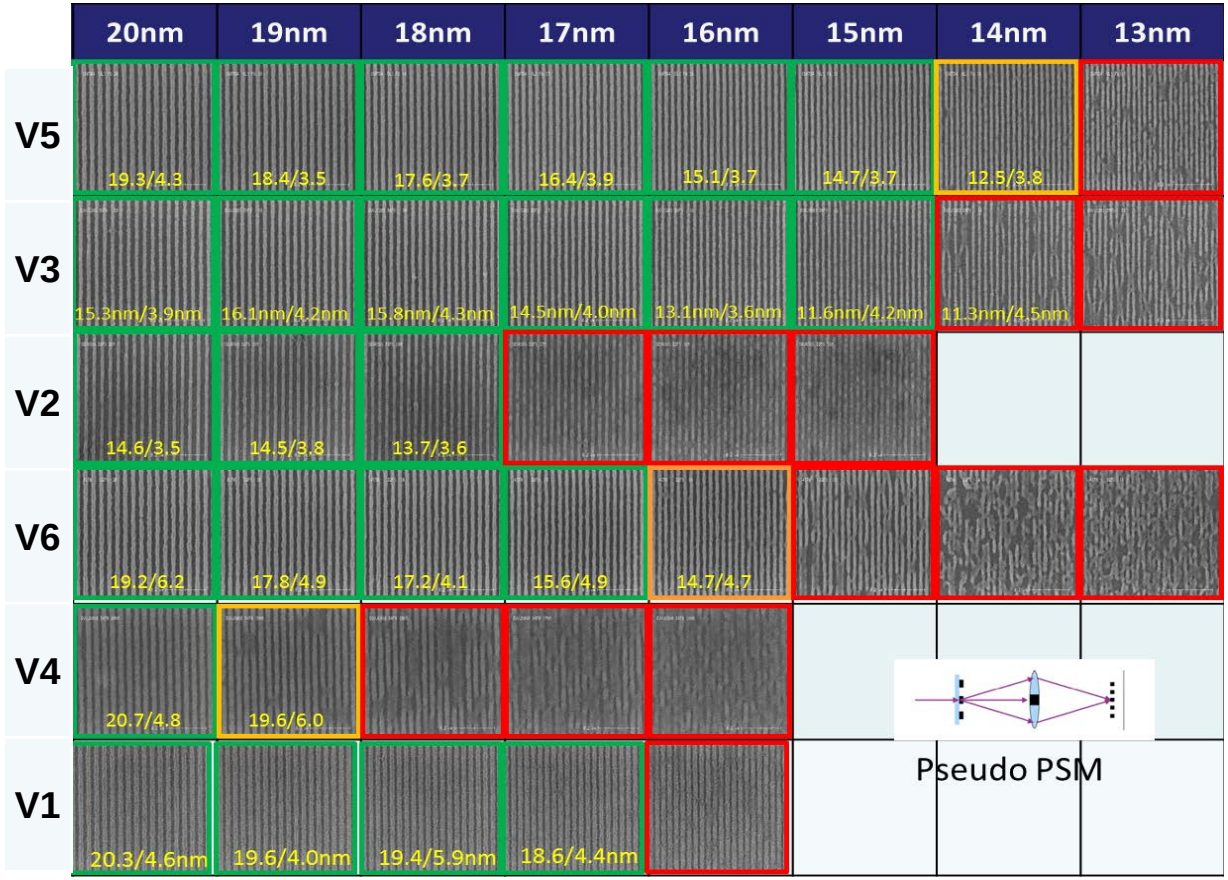
Trend shows improved L-CDU at the expense of sensitivity

Resist Performance Status

Pseudo PSM @ LBNL

Best resolution resist from each supplier

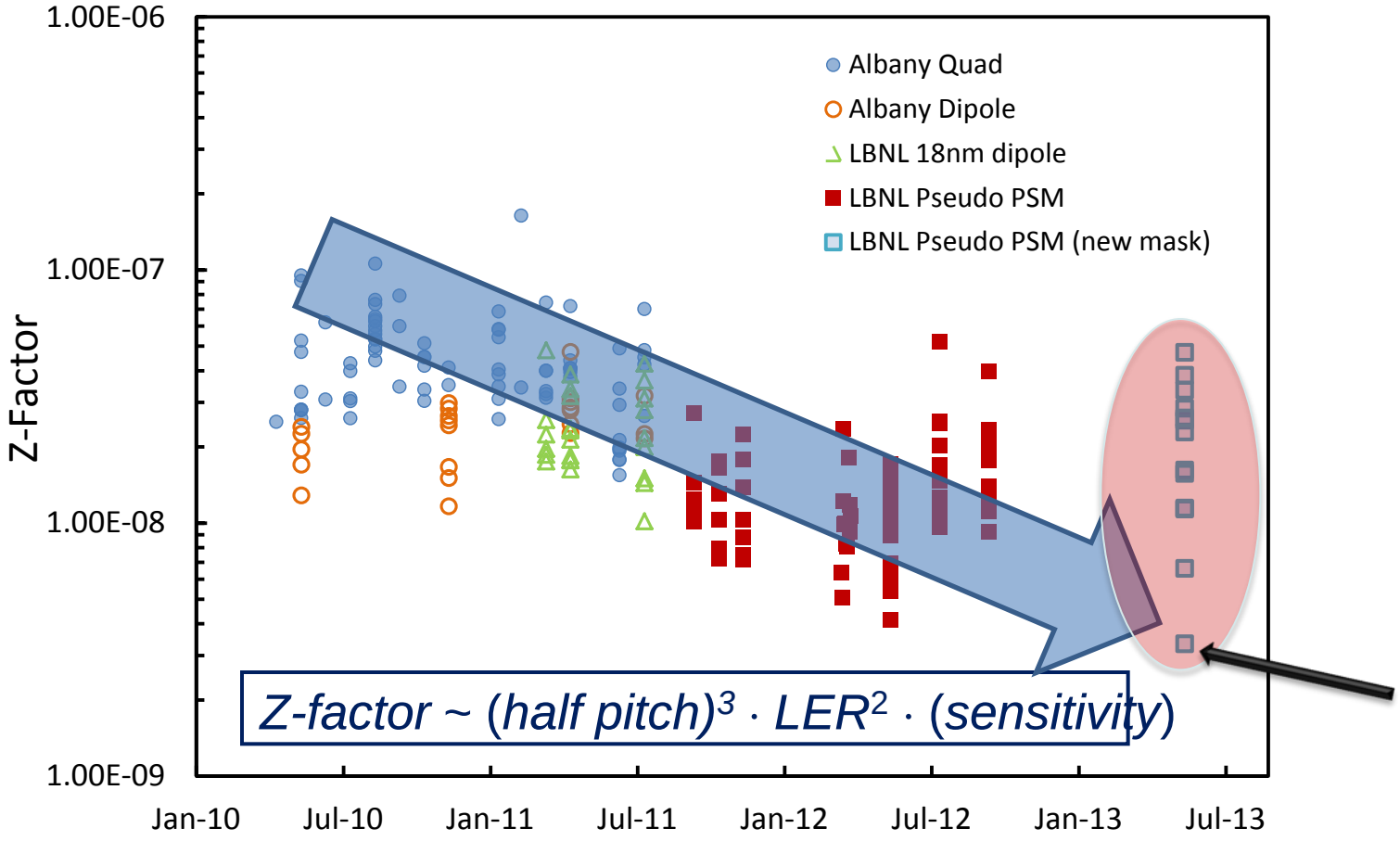




No resist suppliers showed progress in improving resolution compared to previous year

Z-Factor of EUV Resists Over Time

Lines and Spaces



- **Data represent materials from six suppliers**
- **Only one material shows significantly improved Z-value**

July 2013 Outgas tool status & capacity

	Status	Tested to date	Tested since February meeting	Current Throughput (samples per month)
ROX	Up	102	21	10
EUVT	Up	39	36	20
NIST	Up	15 paying, 26 total	5	6
EIDEC	Up	102	42	30 - 40
IMEC	In recertification after downtime	90	21	20
Current capacity		**348**	**125 (~18/month)**	**~90**

Industry request: 250 per month, same as MET tools

Agenda

Time	Title	Presenter
8:30 AM – 8:40 AM	Welcome and Introductions	*F. Goodwin, SEMATECH*
8:40 AM – 9:00 AM	NIST Outgas Testing Update	*S. Hill, NIST*
9:00 AM – 9:20 AM	EIDEC Outgas Testing Update	*S. Inoue, EIDEC*
9:20 AM – 9:40 AM	ROX Outgas Testing Update	*G. Denbeaux, CNSE*
9:40 AM – 10:00 AM	iMEC Outgas Testing Update	*E. Hendrickx, iMEC*
10:00 AM – 10:20 AM	EUVT Outgas Testing Update Outgas Round Robin Testing Update	*J. Sohn, SEMATECH*
10:20 AM – 10:30 AM	Break	
10:30 AM – 10:50 AM	MORE Project Update	*W. Yueh, Intel*
10:50 AM – 11:10 AM	Time Resolved Spectroscopy of Nanoparticle EUV Photoresists	*S. Tagawa, Osaka University*
11:10 AM – 11:30 AM	Development of Block Copolymer Systems for DSA at University of Queensland	*I. Blakey, University of Queensland*
11:30 AM – 11:45 AM	Summary	*G. Denbeaux, CNSE*