



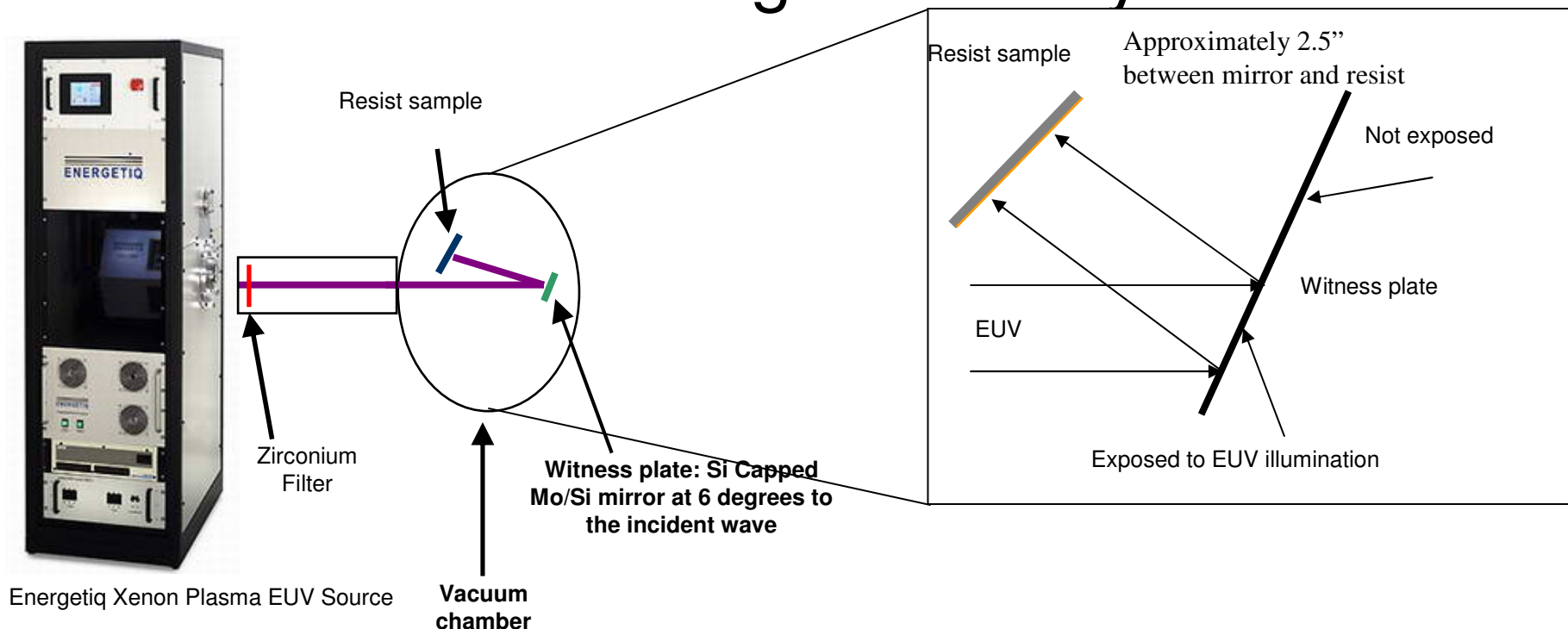
Witness Plate Testing Lessons Learned and Suggestions for Future Protocols

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Witness Plate Experimental Configuration for Resist Testing – First Try...

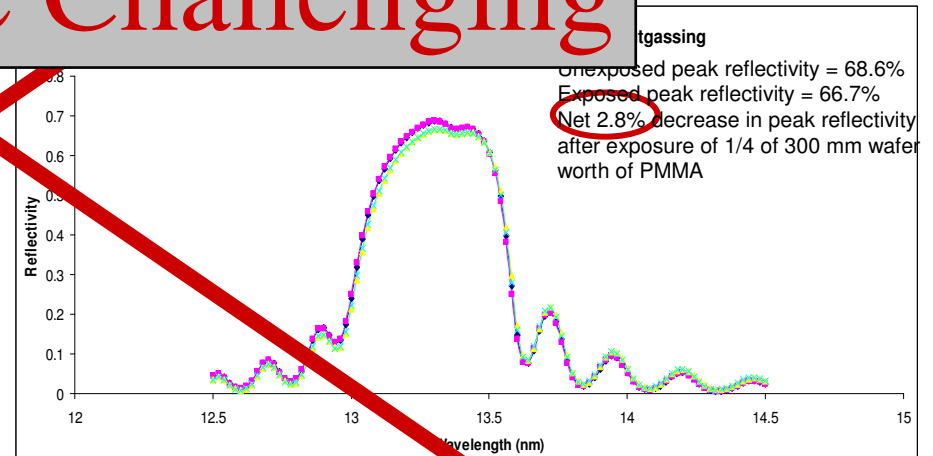
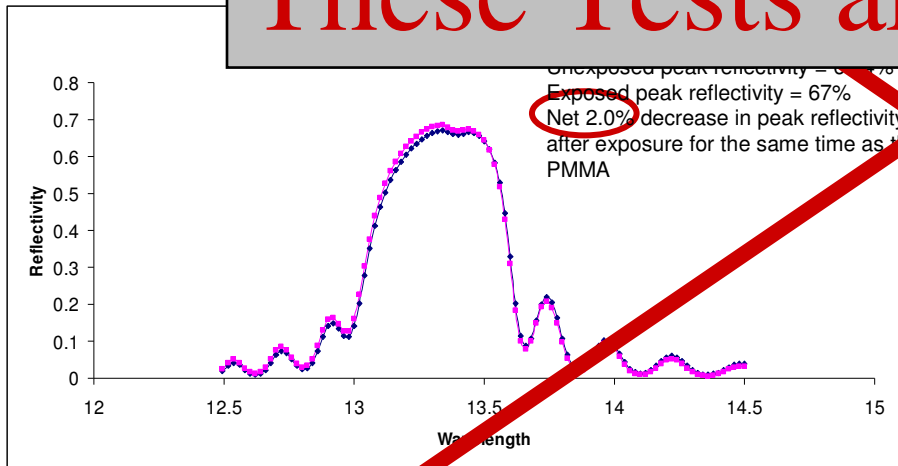


- ASML proposed a test to expose 300 mm wafers worth of resist
 - If reflectivity loss per wafer exposed is $\leq 2\%$, the resist is safe for use

Reflectivity Measurements

Resist	Reflectivity Loss	Control Reflectivity loss	Net reflectivity per 300 mm wafer exposure
PMMA	2.8	2	3.2
High Outgassing (IBM)			
Low Ea (KrF)			
High/Low Ea (KrF)			

These Tests are Challenging

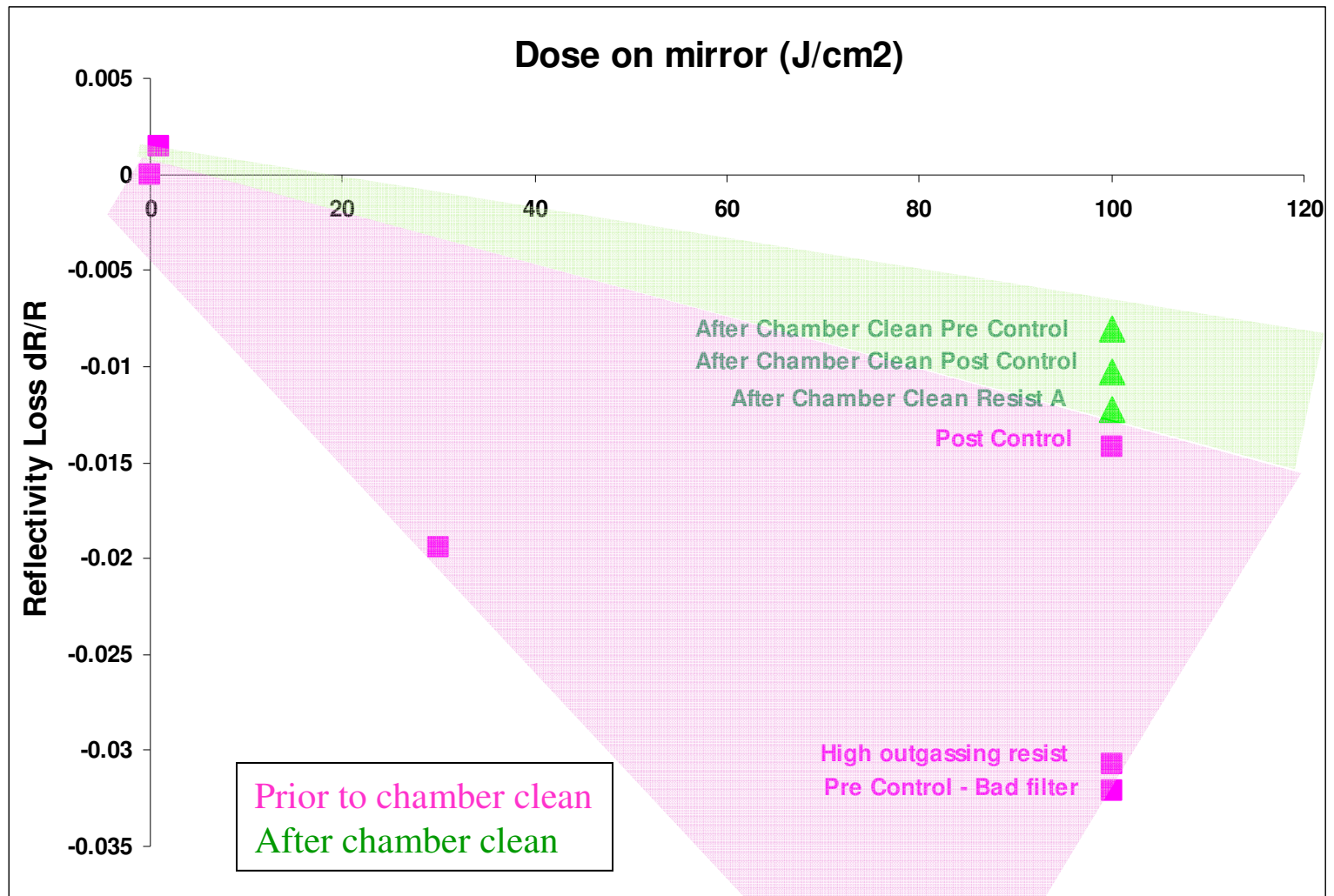


Net peak reflectivity loss due to 1/4 of a 300 mm wafer is 0.8%; therefore, on extrapolating to a full 300 mm wafer PMMA, the peak reflectivity loss is **3.2%**

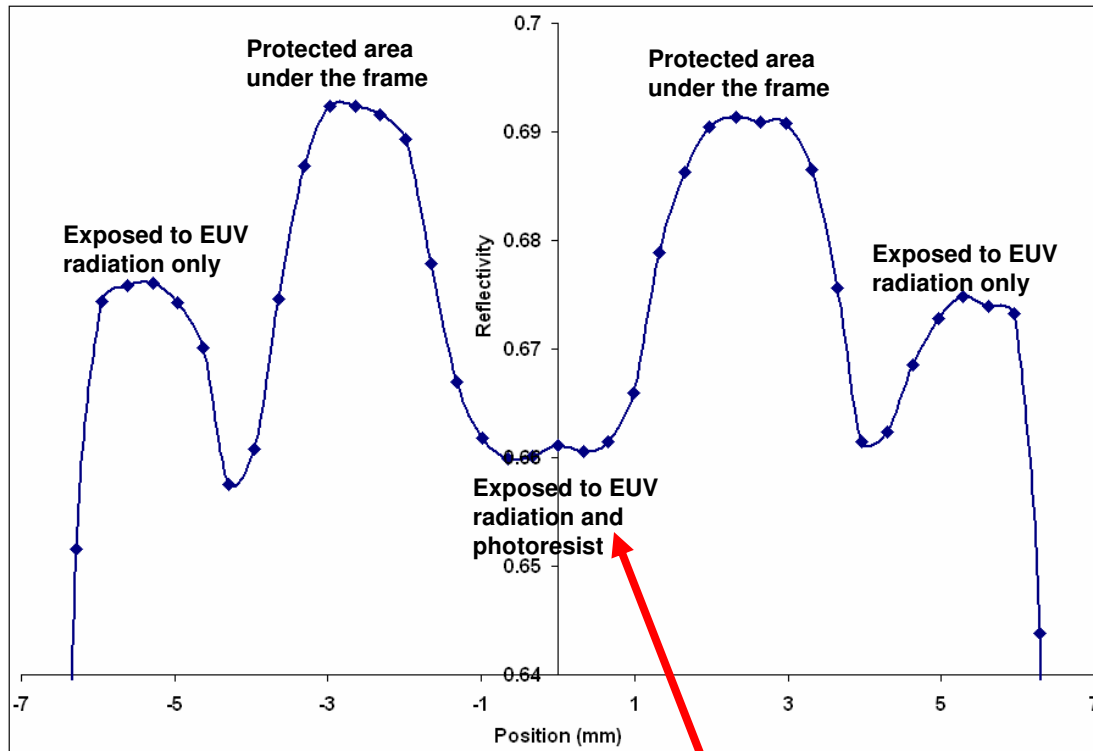
Reflectivity Measurements from Eric Gullikson (CXRO), Steve Grantham (NIST), and Charles Tarrion (NIST)

Witness Plate and Control Mirror Results

- Before chamber cleaning, there were large reflectivity losses and a wide spread in results
- After chamber cleaning, the results were improved
- The effect of the resist was subtle compared to chamber effects



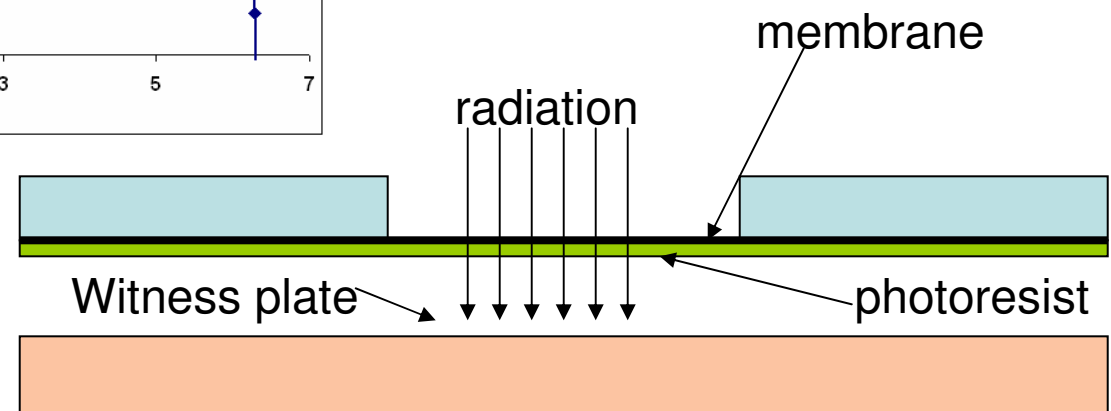
Proposed Faster Witness Plate Test



To get contamination:

1. A molecule must outgas from resist
2. Then hit the mirror
3. Then be present on the mirror when photons arrive
4. Then interact with photons or electrons to break bonds in the molecule to leave carbon

This adds up to a low probability and small signals on witness plate tests



Results of first tests show effect of resist on mirror contamination
More resists to follow