

# SFET Optics Contamination Learning Update

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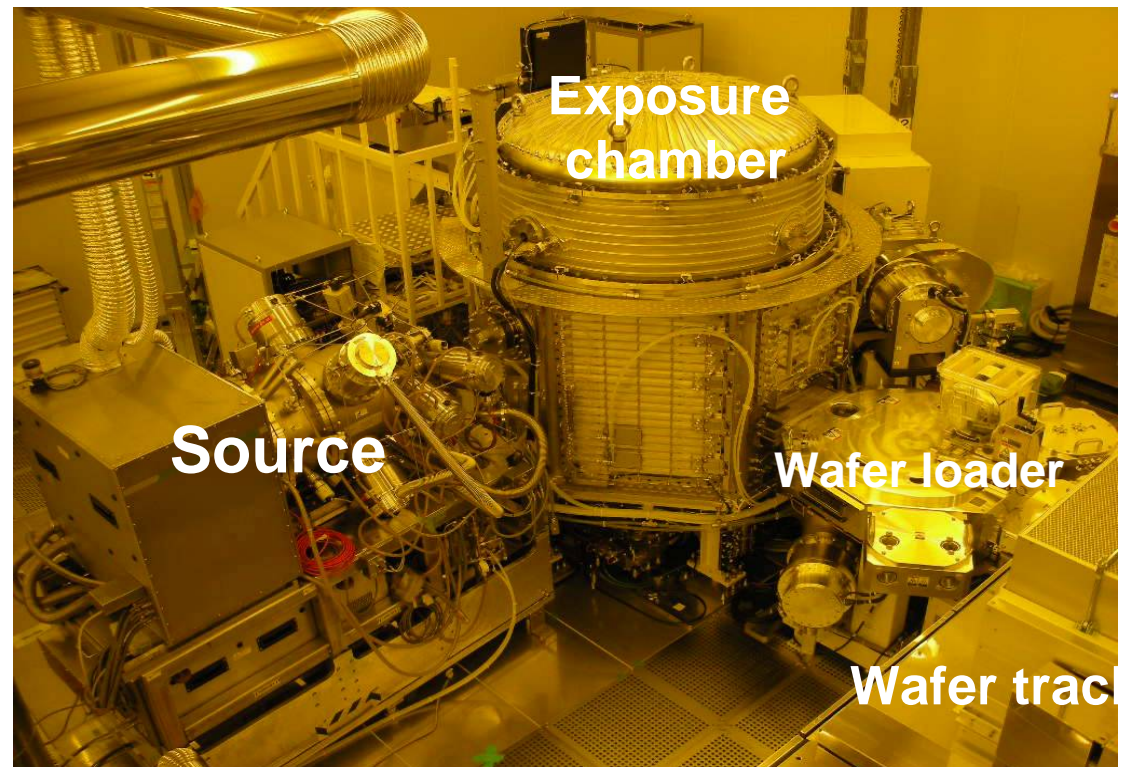
**This work was supported by NEDO**

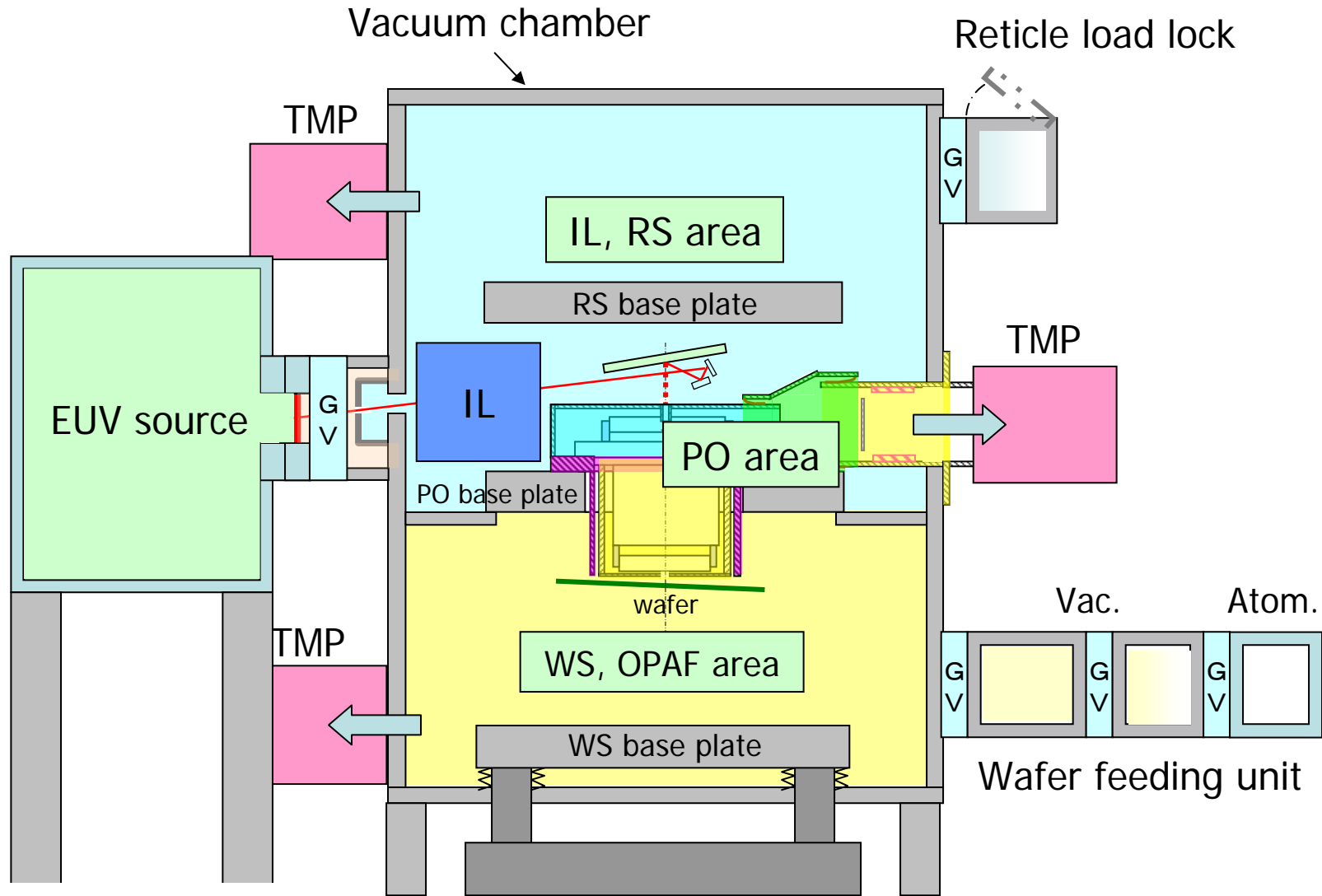
Oct. 2, 2008

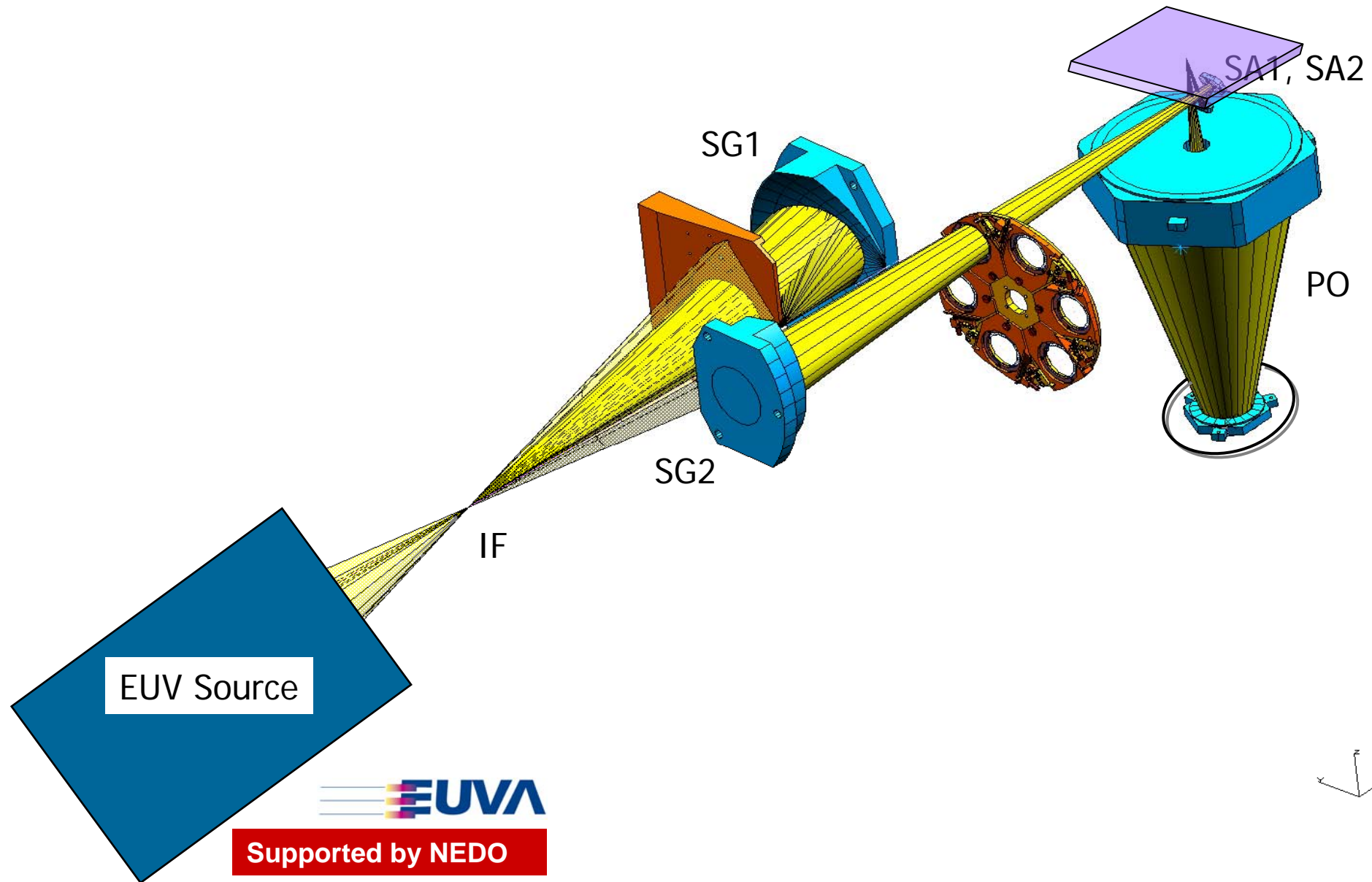
## Purposes

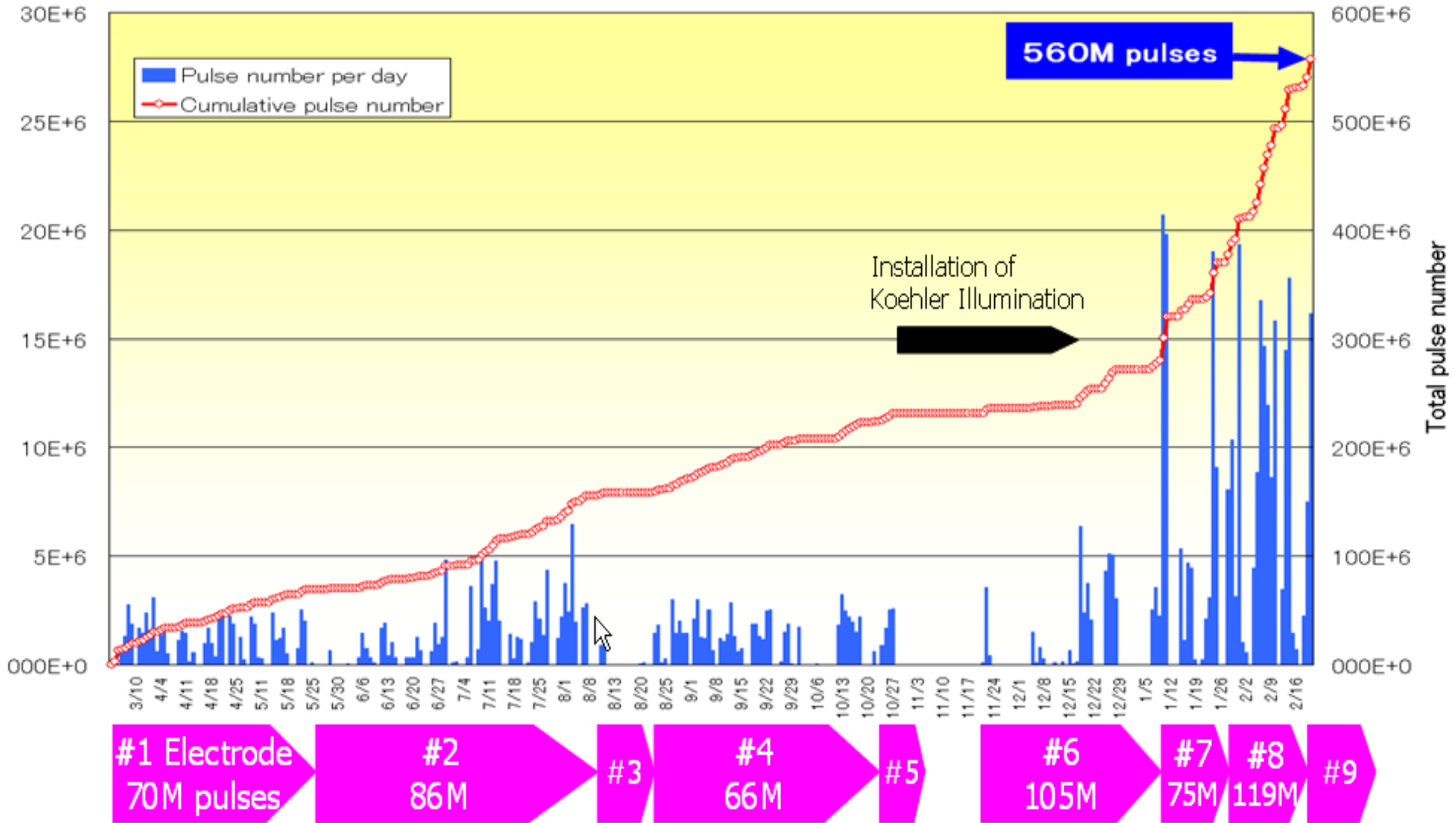
- ◆ Optimize mask structure
- ◆ Develop resist materials
- ◆ Evaluate optics & source lifetime

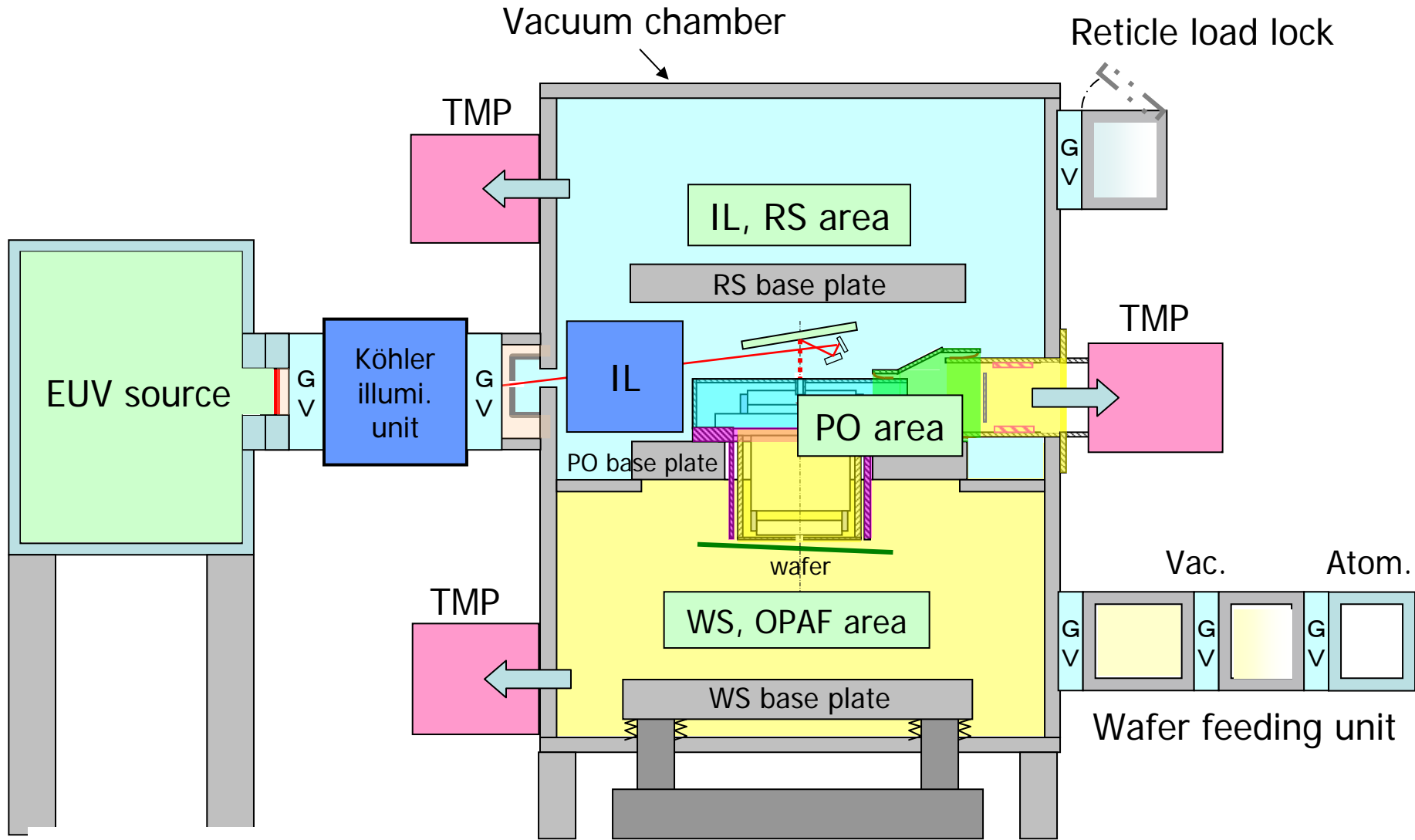
Items	Specification
NA	0.3
Field size	0.2 x 0.6 mm
Magnification	1/5
Wafer size	300mm



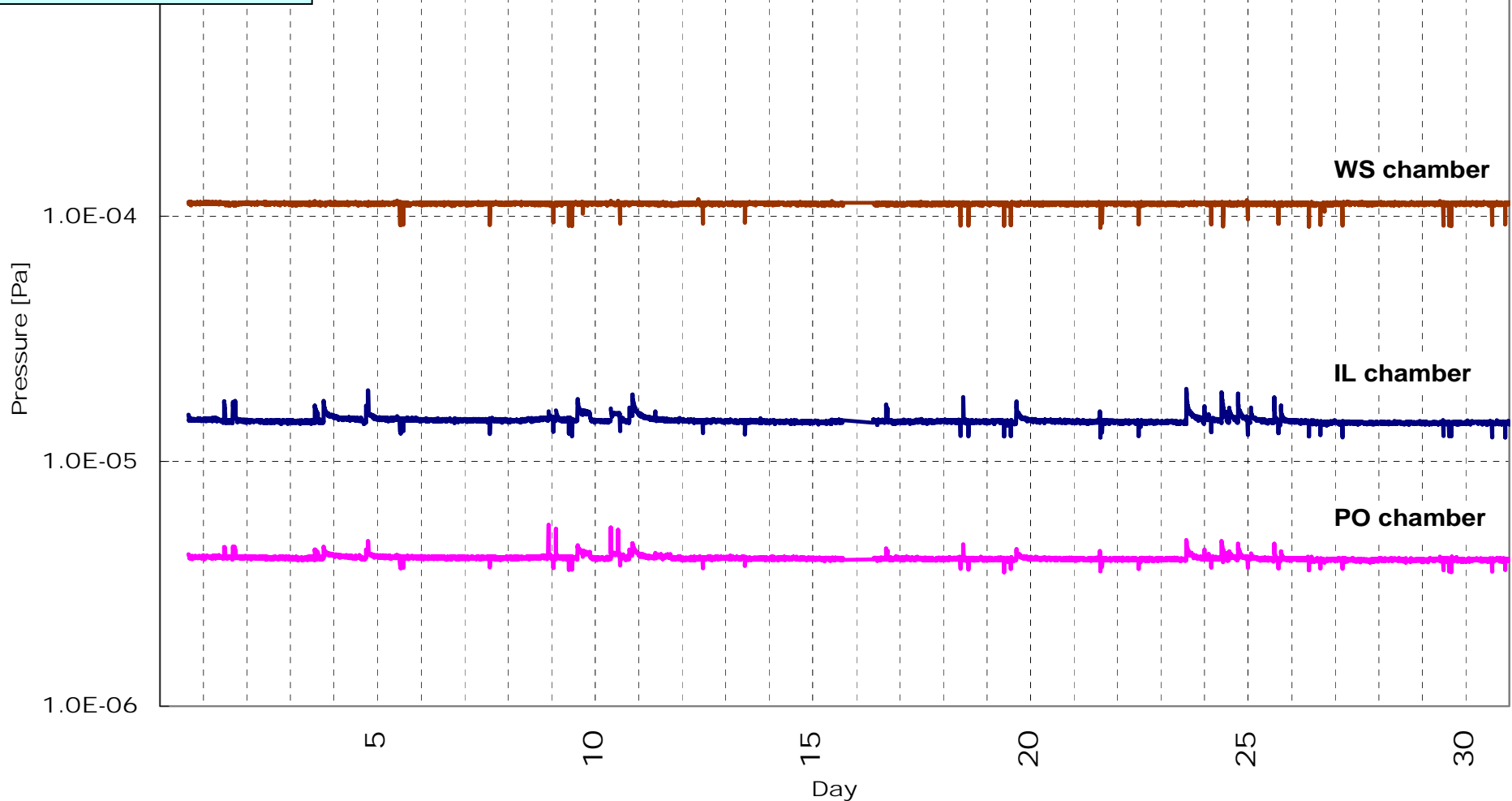






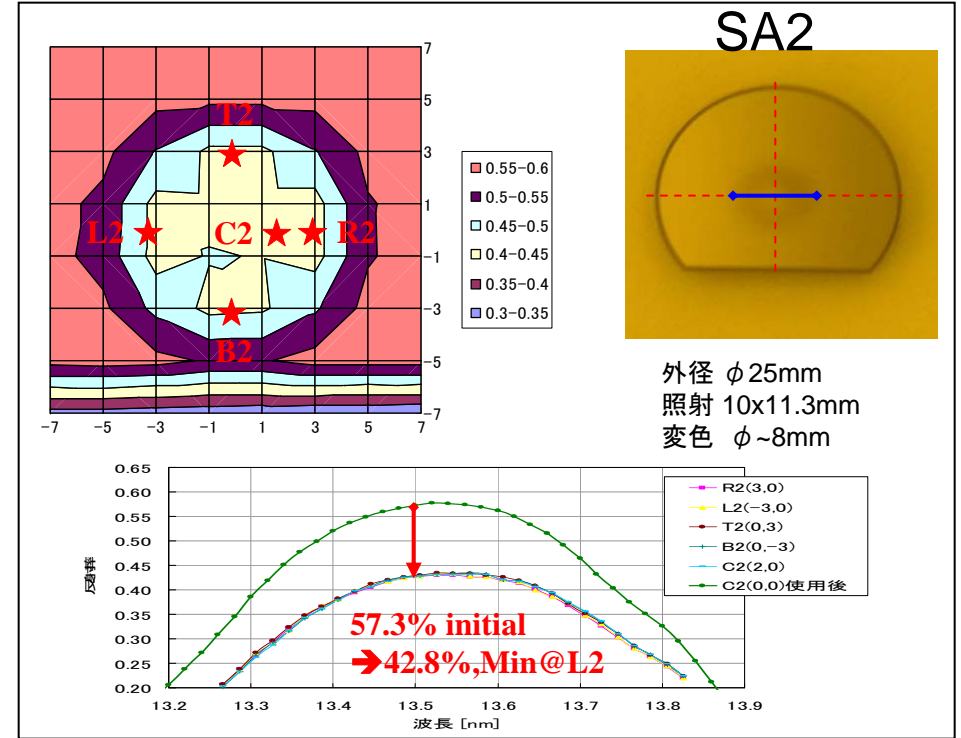
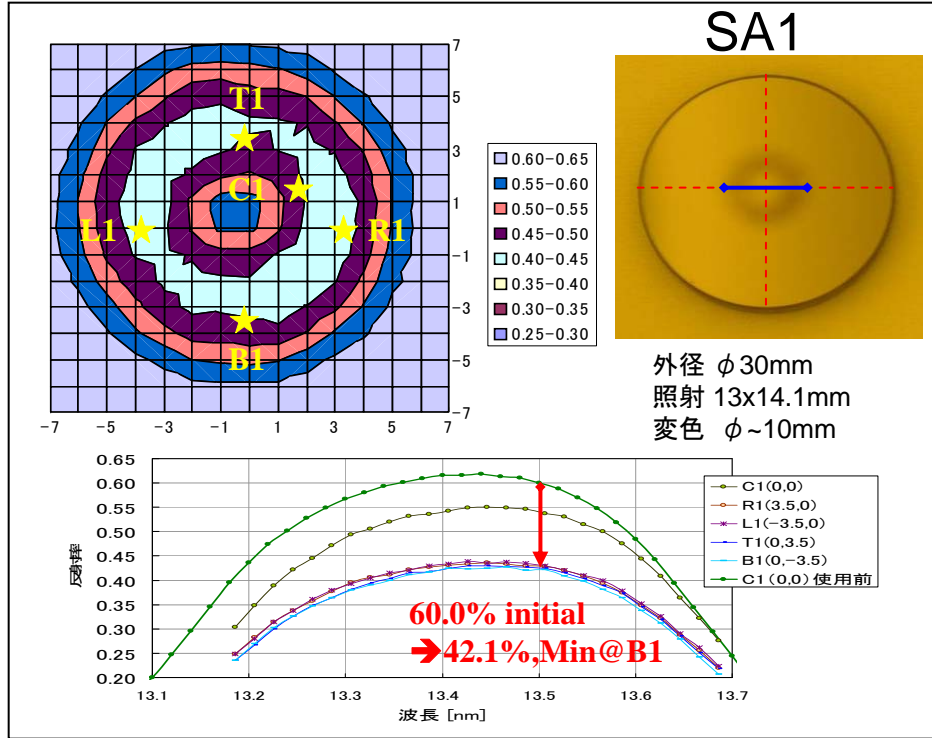


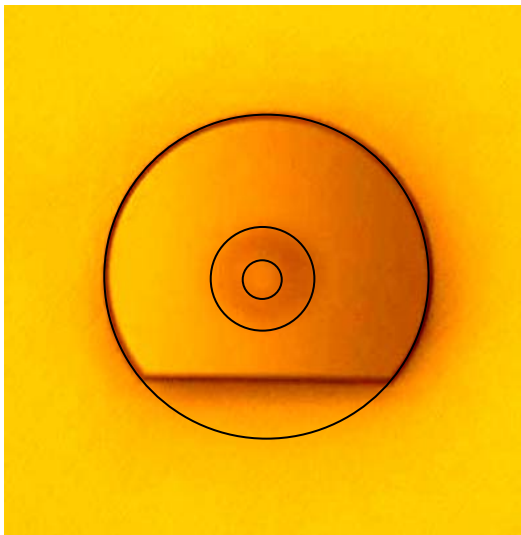
30-days stability



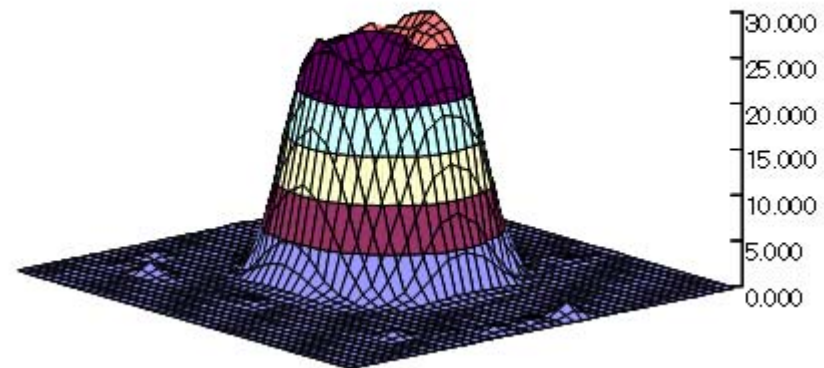
Chamber pressure is well keeping during tool running  
eventhough wafer & mask in/out .

# Contamination of SFET illumination Optics

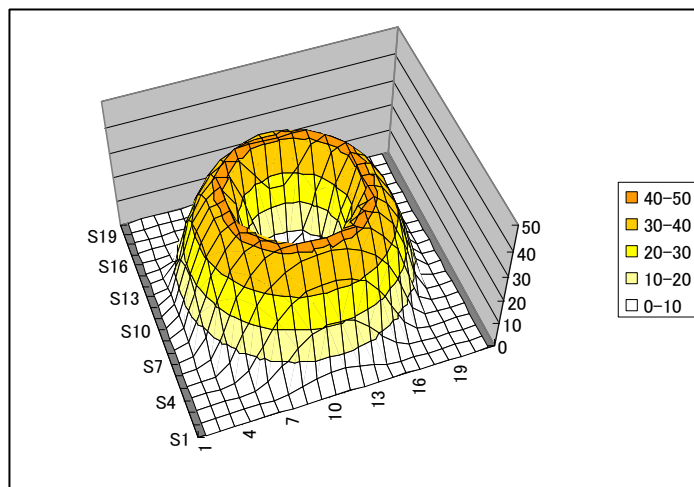




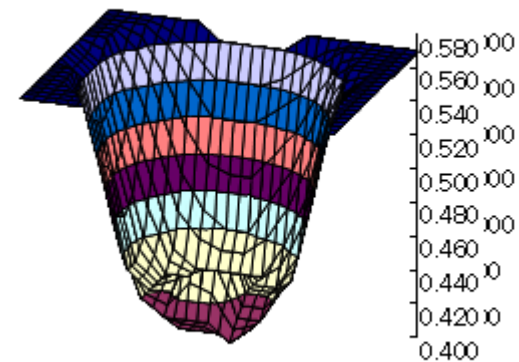
Film thickness



Estimated intensity



Reflectivity loss



- ◆ Ellipsometry
- ◆ TEM (transmission electron microscopy)
- ◆ Micro beam GIXR (Grazing Incidence X-ray Reflectometry)
- ◆ XPS (X ray photoelectron spectroscopy)
- ◆ Raman spectroscopy
- ◆ EELS (electron energy-loss spectroscopy)
- ◆ RBS (Rutherford backscattering spectroscopy)
- ◆ ERDA (Elastic Recoil Detection Analysis)
- ◆ TOF-SIMS (Secondary ion-microprobe mass spectroscopy)
- ◆ ATR-FTIR (attenuated total reflectance Fourier transform infrared spectroscopy)

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- SFET SA2 mirror contamination was analyzed with many surface analysis methods. Major species are carbon. Details will be reported elsewhere.
  - Contamination growth rate was estimated.
  - If scaled linearly to EUV intensity on HVM PO mirror, very short life time is expected. Precise estimation should count the non linear dependence on intensity and pressure.
  - Modeling for carbon contamination growth is necessary for precise lifetime scaling.

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