Outgassing Measurement in the University of Hyogo (NewSUBARU)

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Outline

1. The detail of resist evaluation system

2. Outgassing measurement result

Setup of novel resist evaluation system

1) Measurements of sensitivity
2) Outgas characteristics
3) Chemical reaction analysis

Simulating six-mirror optics

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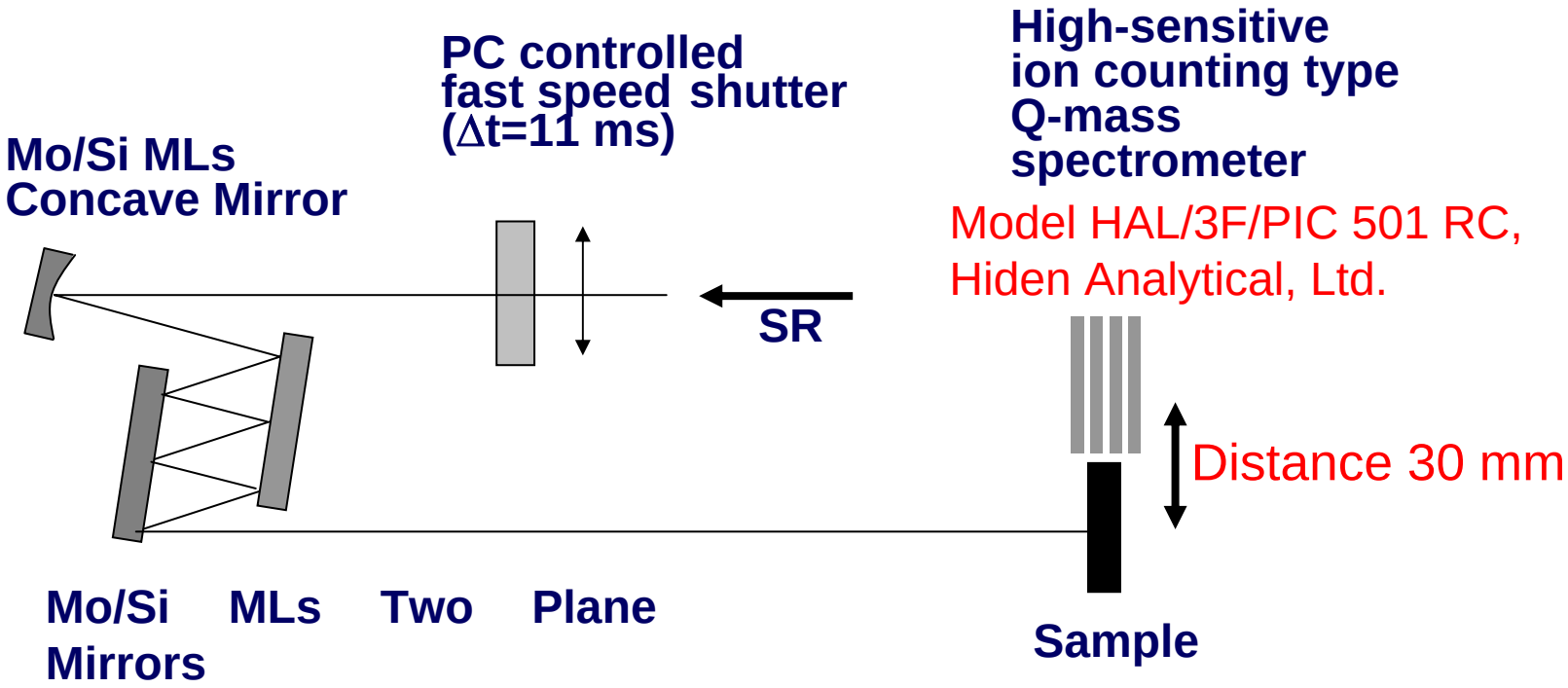
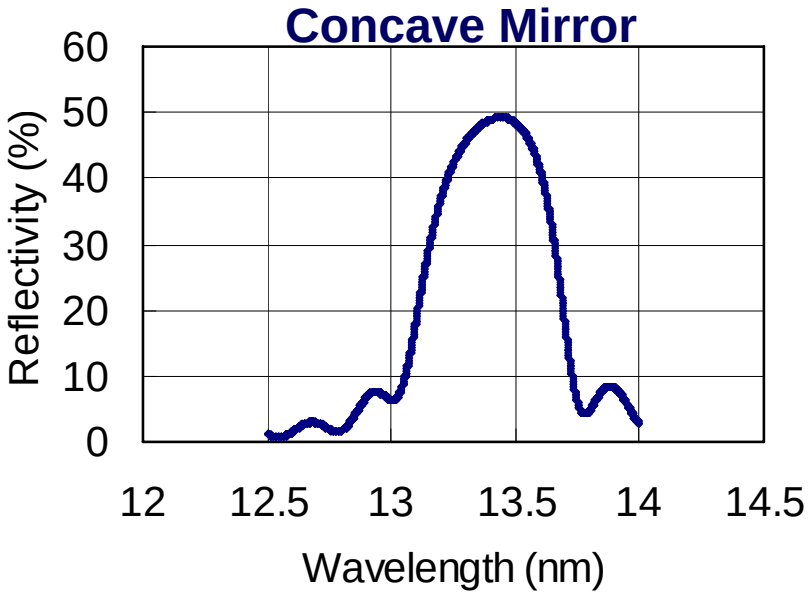
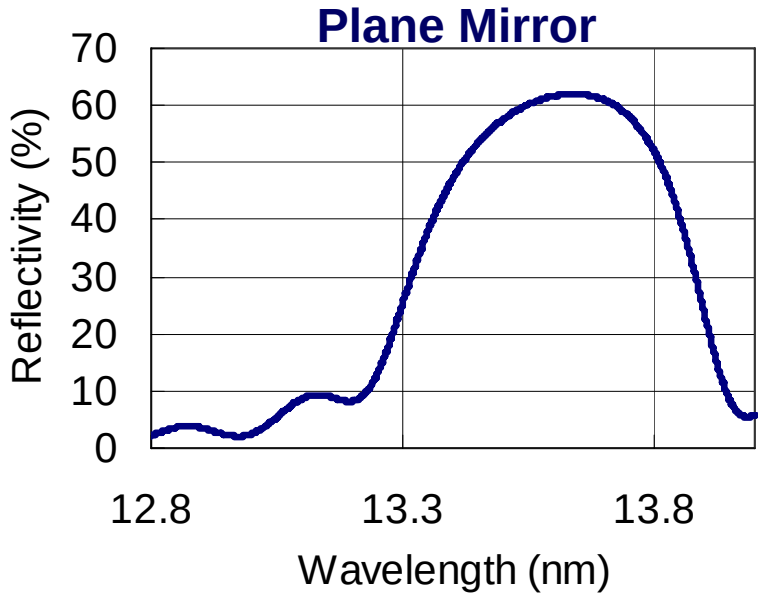
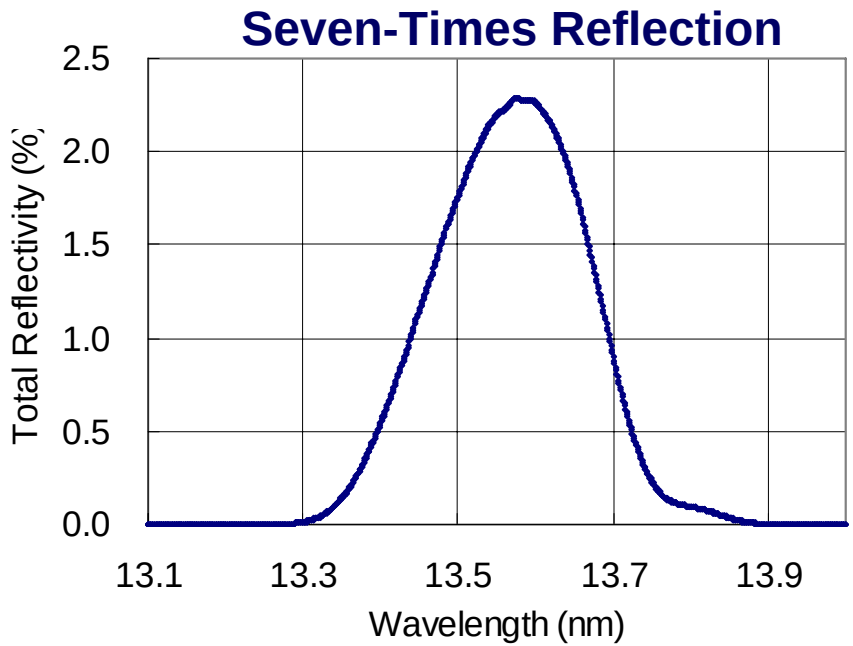
Practical exposure spectrum



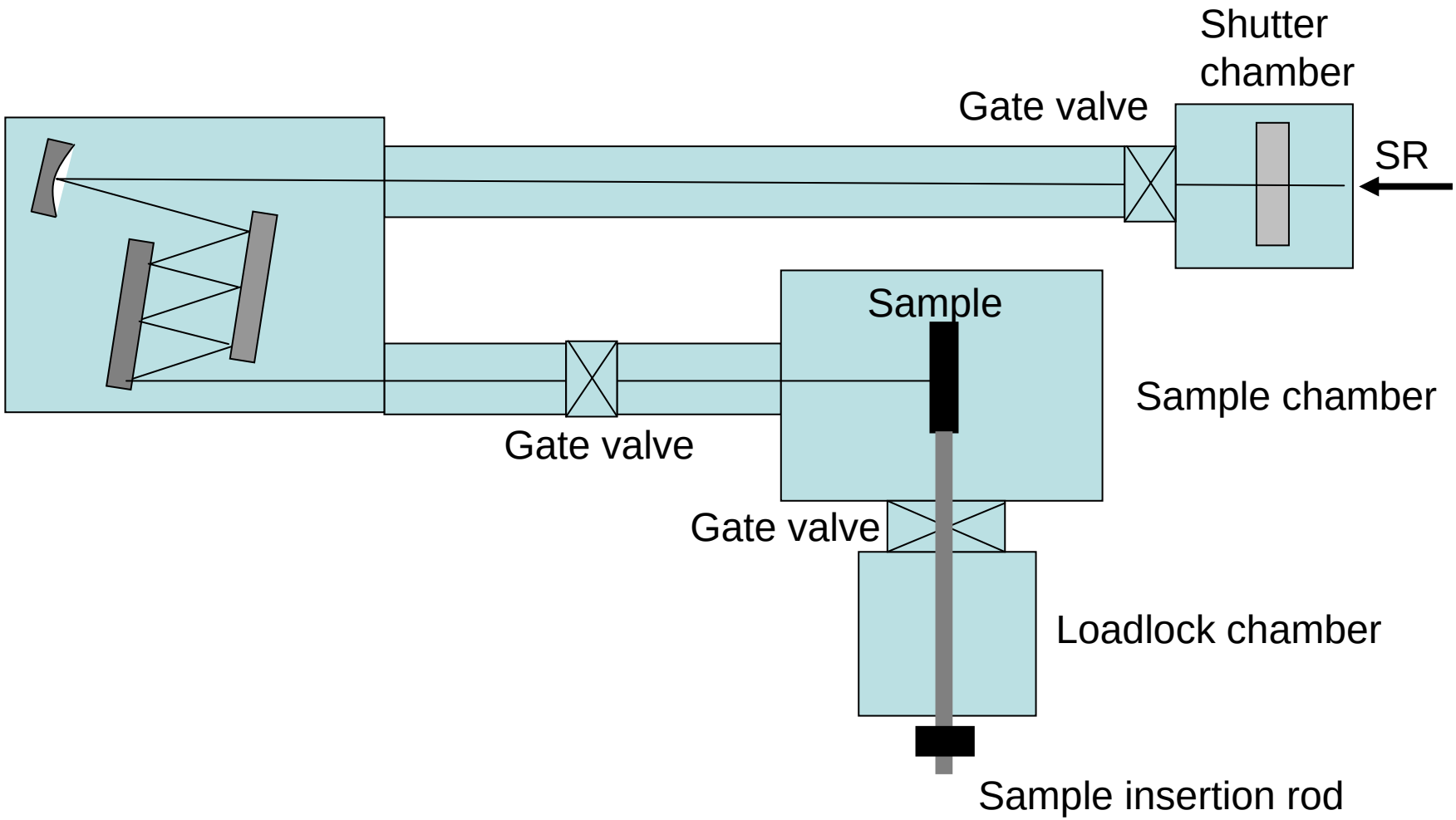
Reflectivities spectra of Mo/Si MLs



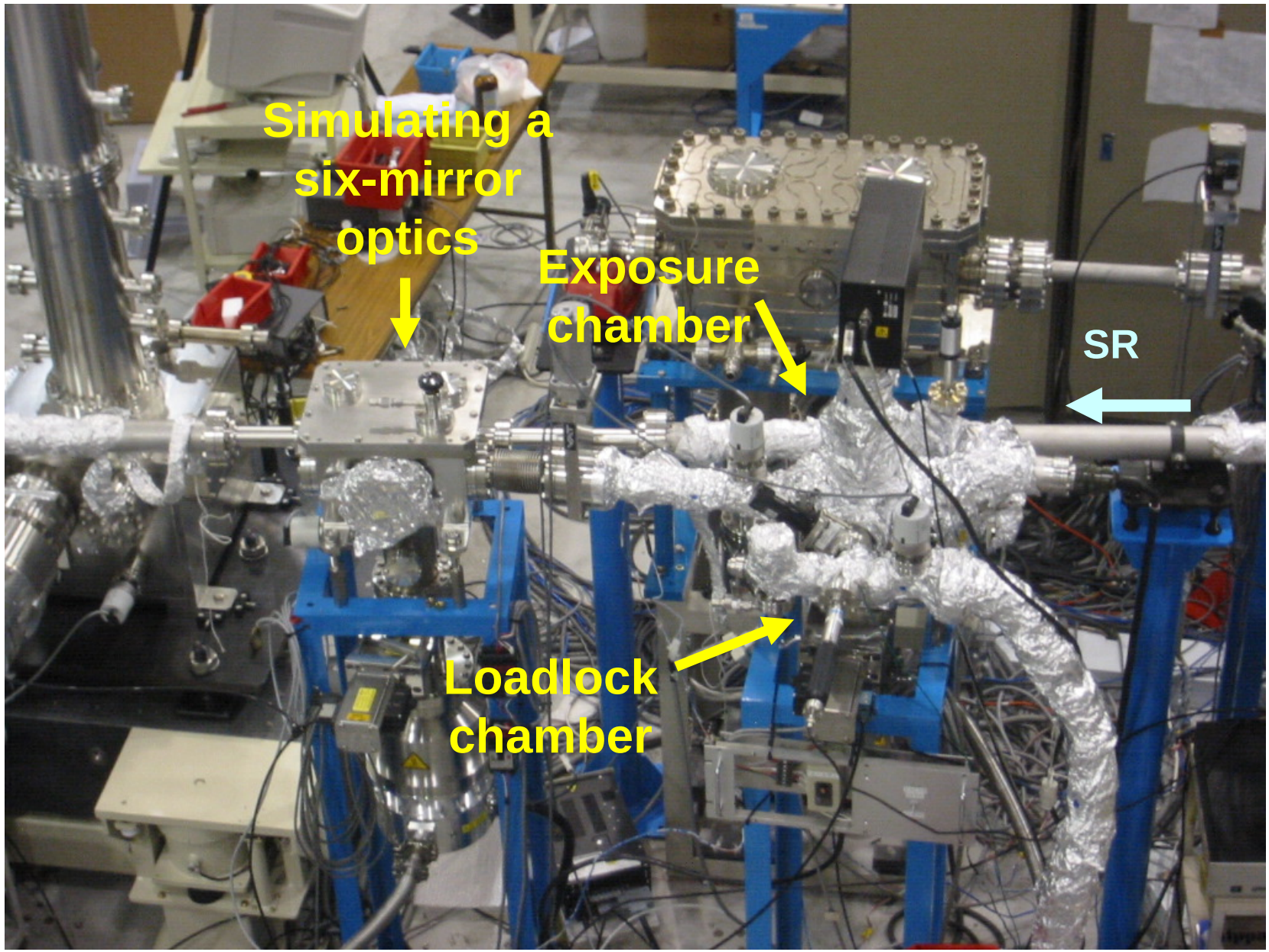




Setup of novel resist evaluation system



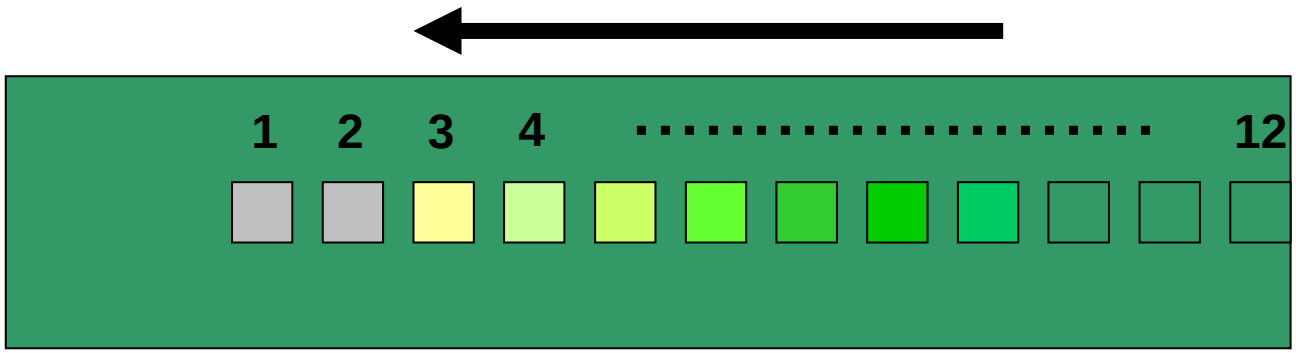
Setup of resist evaluation system



Sample exposure

Loadlock chamber
Pumping time **1 hour to 10^{-5} Pa**

Sample chamber **2×10^{-6} Pa**
Sample size **85 mm × 18 mm**
Exposure area **4 mm × 4 mm / shot**
Total shots **12 shots/sample**

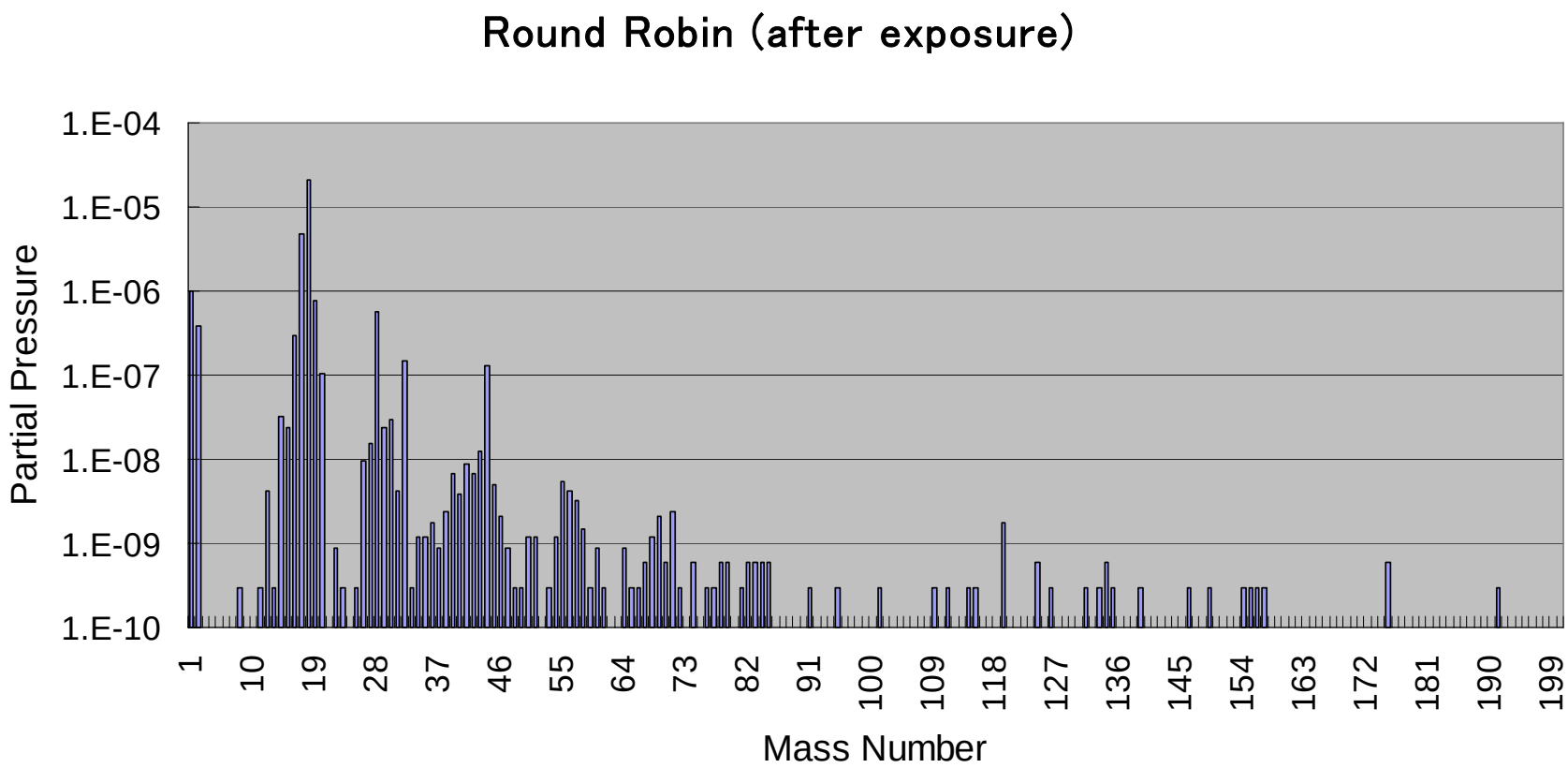


Experimental Conditions

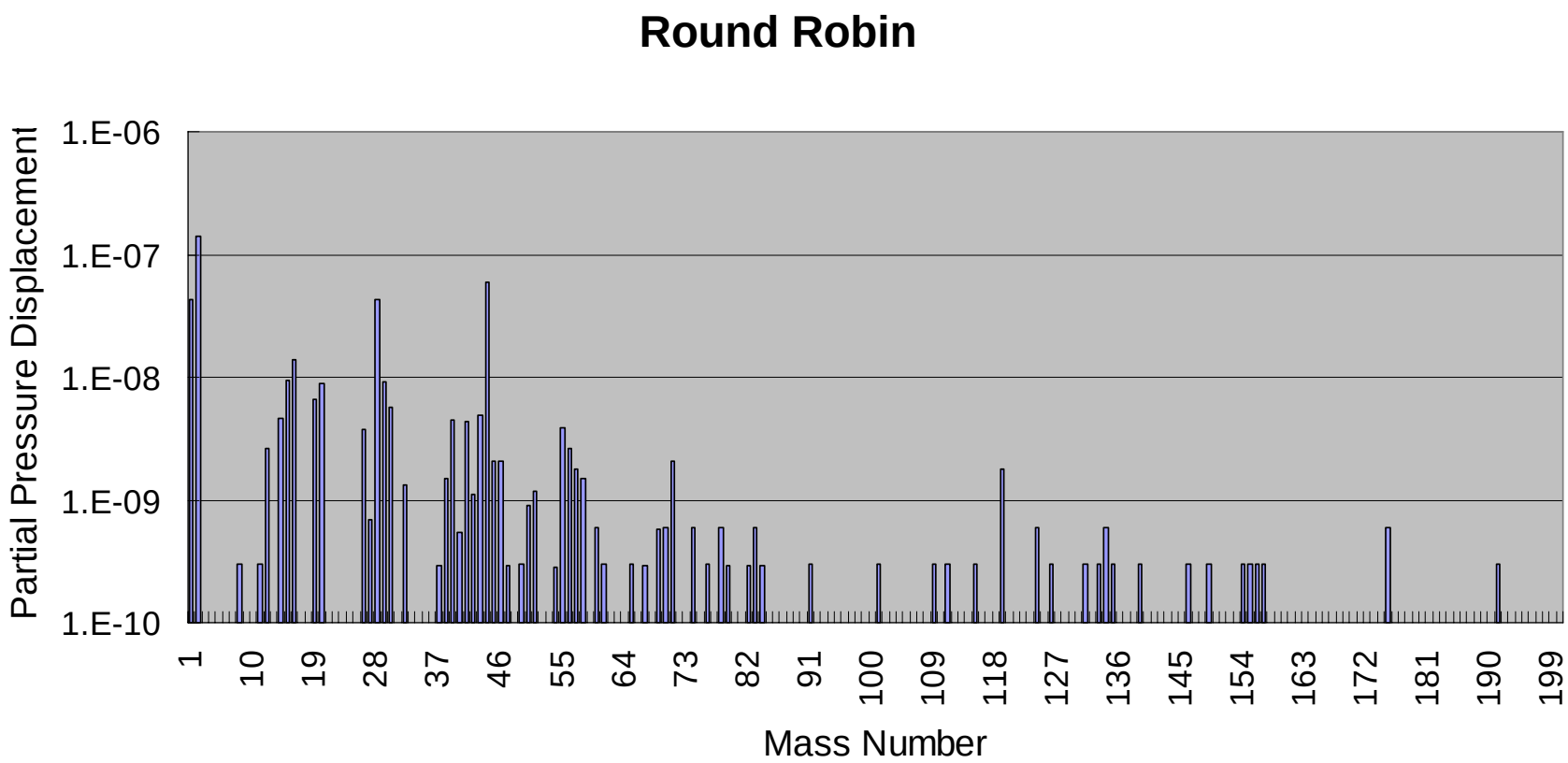
- **Substrate : Si Wafer**
- **Film Thickness : 125 nm**
- **PAB : 140℃ 60 s**
- **Exposure : λ = 13.5nm**

  200mA (0.05 mW/cm^2)

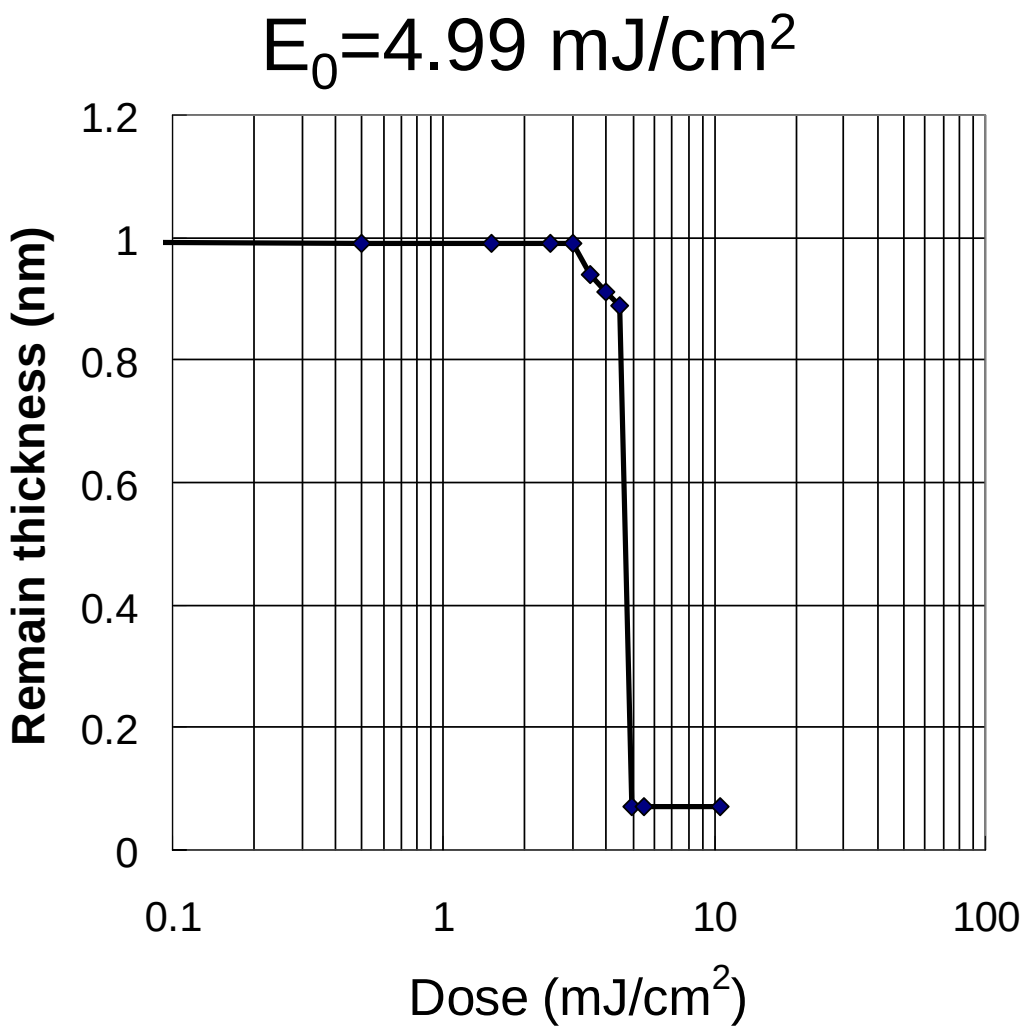
Partial pressure after exposure



Partial pressure displacement after and before exposures



Sensitivity Curve of Round Robin Sample



Summary (1/2)

Total pressure (Pa)	**4.02×10^{-7}**
molecules/s/cm^2	**2.39×10^{14}**
Sensitivity	**4.99 mJ/cm^2**
molecules/cm^2	**2.39×10^{16}**

$$M(molecules/s/cm^2) = \frac{P(Pa) \times 300(l/s) \times 6.02 \times 10^{23}(molecules)}{22.4(l) \times 760(torr) \times 133.32(Pa/torr) \times 0.4(cm) \times 0.4(cm)}$$

Summary (2/2)

Partial pressure displacement after and before exposure (Pa)

H, H2	CO	CO2	Isobutene	Benzene	t-butylbenzene	≥45	Total
1.83E-05	4.25E-06	5.95E-06	2.66E-07	5.96E-08	2.68E-07	3.32E-08	4.02E-05
4.55E-01	1.06E-01	1.48E-01	6.62E-03	1.48E-03	6.68E-03	8.26E-04	Ratio