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Nikon, Precision Equipment Company

Acceptable Photoresist Outgassing

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Updated Acceptable Outgassing Rate

Assumption

Degree of Vacuum of PO — $1X10^{-5}$ Pa for H2O
$1X10^{-7}$ Pa for CxHy

Resist Outgas/Residual Gas — 1/20

Updated Acceptable Rate for α-tool

	Outgassing Rate [molecules cm^{-2} s^{-1}]
H2O	$7X10^{14}$
CxHy (] 45 amu)	$7X10^{12}$

About EUV Intensity on Wafer

Nishiyama-san @ASET

Estimation of EUV intensity on wafer in production tool

Method-1 : from the source power of 115 W@IF。

Total reflectivity loss of by 12 multilayer mirror(R=68%) = 0.01
Reflectivity loss by mask (65%)= 0.65
Other loss (50%: not sure) : 0.5 →Total : 0.35 %
EUV power leaching onto wafer is 0.4 W. IF the exposure area is assumed to be 0.5cm^2, EUV intensity on wafer is 0.8 W/cm^2.

Method-2: from throughput of 100 WpH and resist sensitivity of 5mJ/cm^2

Exposure area= π x(15cm)^2 x 80%(effective area ratio) =565 cm^2
Exposure time=3600s/100x40%(overhead correction) =14.4 s

$$\text{Power} = \frac{5\ \text{mJ/cm}^2}{14.4\ \text{s}} \times 565\ \text{cm}^2 = 0.2\ \text{W}$$

EUV intensity =0.2W/0.5 cm2 = 0.4 W/cm^2

Though there are twice discrepancy, It is not so bad..

Temporary, we adopt 0.2 W for power and 0.4 W/cm2 for intensity.

EUV Process Technology

The estimation seems OK.

Recommended Measurement Condition

- In-situ and in real time measurement by RGA and pressure gauge is preferable.
- Two mass ranges: H_2O (17,18 amu) and] 45 amu
- Condition of resist-coated wafer must be unified if at all possible.
  - ✓ Time after coating
  - ✓ Storage atmosphere
  - ✓ Time after evacuation
  - ✓ Time before EUV irradiation
- Estimation of intensity dependency is also required.