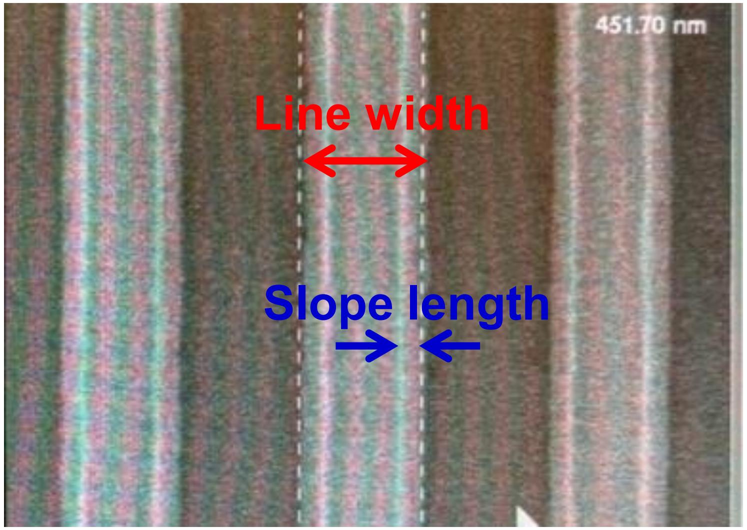
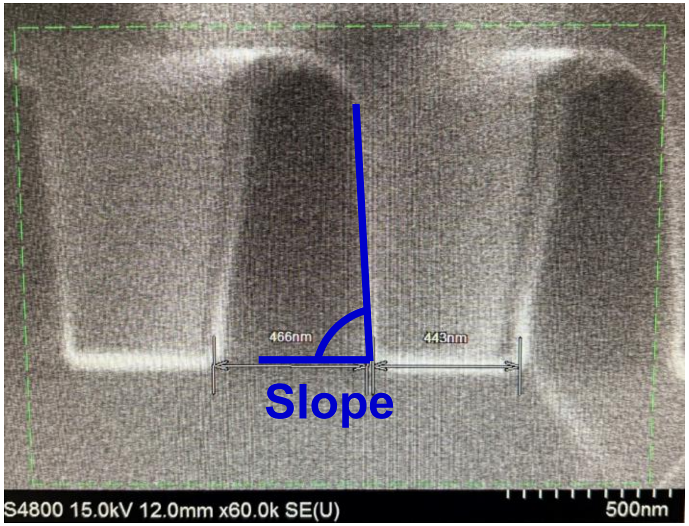
Quality control criteria (1:1 Line pattern)

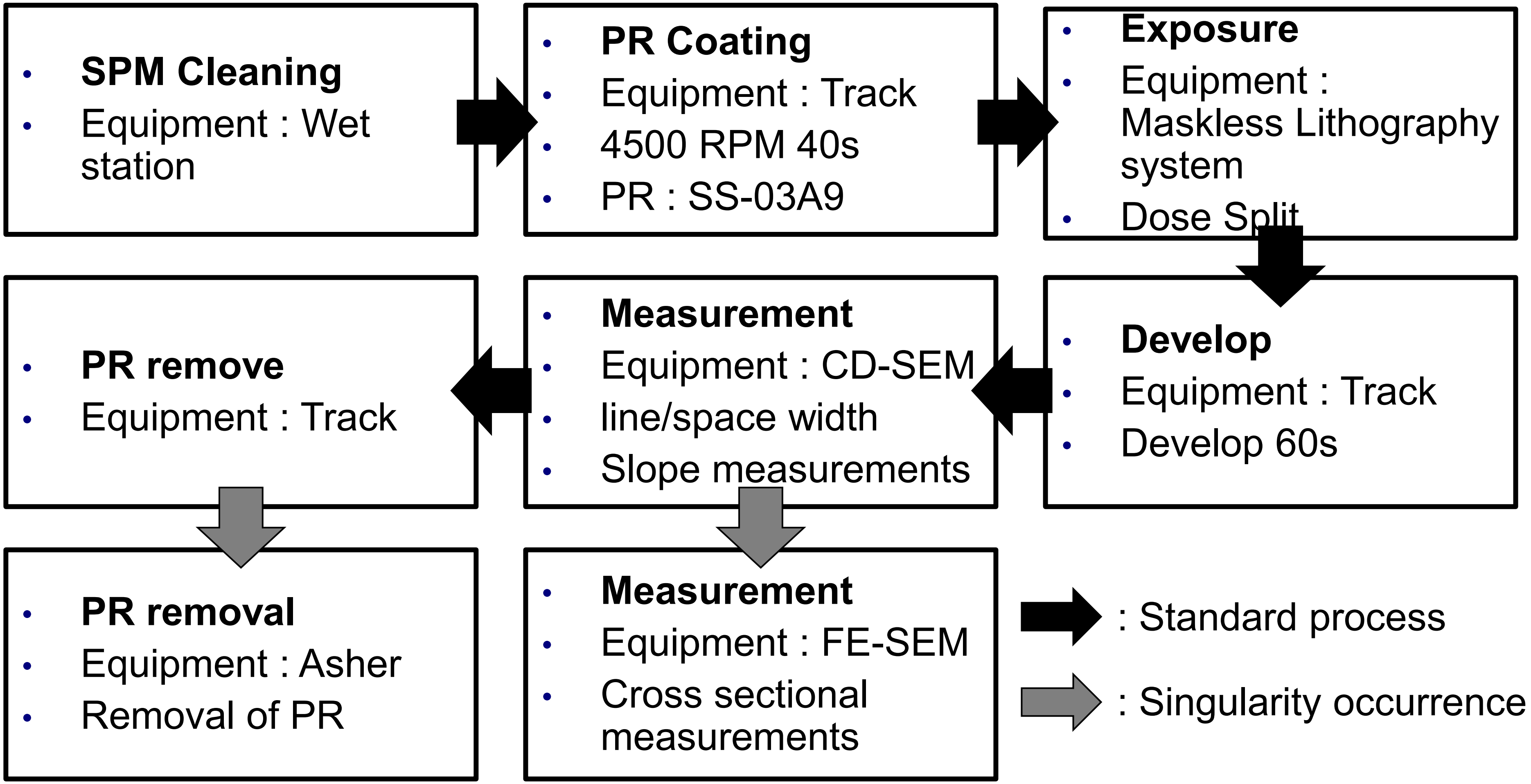
Equipment	**Target Width [nm]**	**Allowable width [nm]**	**Allowable slope [°]**
Maskless	**500**	475 ~ 525	**> 80°** (Slope length > 158 nm)

* Allowable error in width : ±5%
* Allowable slope calculation : 900 / $\tan 80°$ ≈158 nm (Assume PR thickness ≈ 900 nm)





QC process flow (Run sheet)



- **SPM Cleaning**
- Equipment : Wet station

- **PR Coating**
- Equipment : Track
- 4500 RPM 40s
- PR : SS-03A9

- **Exposure**
- Equipment : Maskless Lithography system
- Dose Split

- **Develop**
- Equipment : Track
- Develop 60s

- **Measurement**
- Equipment : CD-SEM
- line/space width
- Slope measurements

- **PR remove**
- Equipment : Track

- **PR removal**
- Equipment : Asher
- Removal of PR

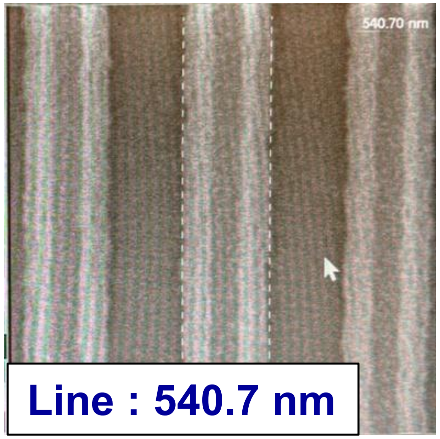
- **Measurement**
- Equipment : FE-SEM
- Cross sectional measurements

➡ : Standard process

⇨ : Singularity occurrence

Dose split exposure for optimized condition

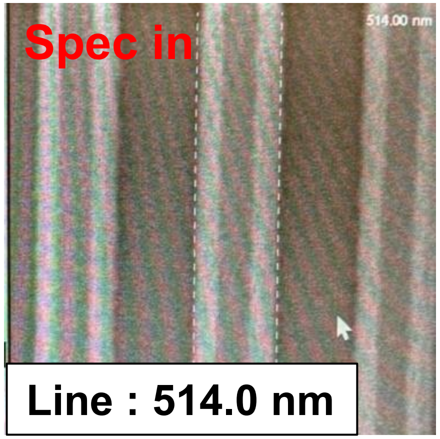
70 mJ/cm^2



Line : 540.7 nm

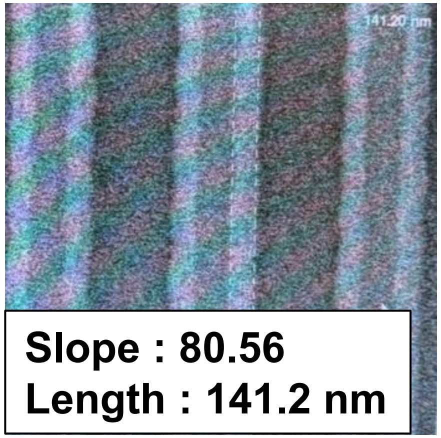
Slope : 77.78
Length : 183.7 nm

80 mJ/cm^2



Spec in

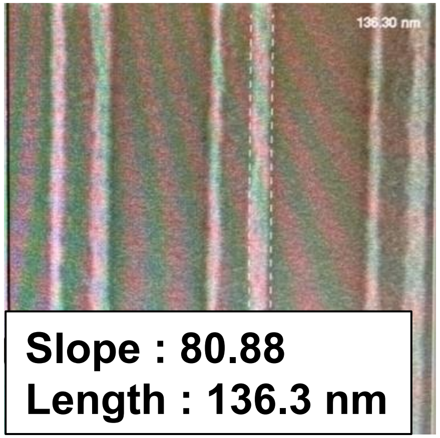
Line : 514.0 nm



Slope : 80.56
Length : 141.2 nm

90 mJ/cm^2

Line : 419.9 nm



Slope : 80.88
Length : 136.3 nm

Conclusion

- **QC of Maskless (01)**
  - Verification of optimal process conditions for implementing 500 nm 1:1 line pattern and feasibility evaluation