Resist screening with EUV Interference Lithography: from omelet lithography to state-of-the-art performance resists

EUV Workshop 2021
A brief history of photoresists

1826
“View from the Window at Le Gras”

2020
NXE 12” wafer

\[ CD = k_1 \frac{\lambda}{NA} \]

- Dichromated gelatin
- Diazonaphthoquinone (DNQ)
- Chemically Amplified Resist (CAR)
- Non-CAR (Molecular, Metal oxide, …)
EUV Interference lithography
XIL-II beamline @SLS

- Synchrotron light source $\lambda=13.5$ nm (4% BW)
- Diffraction gratings masks
- L/S (and CH) interference pattern exposures

➢ Stripped down optics
➢ Focus independent
➢ High resolution
Egg-white EUV lithography

- **Water-based bioresist**
  - UV/electron irradiation sensitive
  - Tunable from neg. to pos. resist
  - Good adhesion
  - Natural & abundant
  - Limited in RLS performances

**Process Flow**

1. Egg
2. Crack, filter & spin-coat
3. UV Exposure protein aggregation
4. H₂O development

**Technical Details**

- HP 60 nm, D = 100.4 mJ/cm²
- 250 nm
Conclusion & perspectives

• EUV electron chemistry potential underlined

• Investigation of alternative resists with EUV-IL to push understanding of EUV electron chemistry

Albumen HP 60 nm vs. CAR HP 11 nm

DUV
E = 6 eV

EUV
E = 92 eV
Thank you for your attention!

Acknowledgements:
Lidia Van Lent-Protasova
Jara Garcia-Santaclara
Iacopo Mochi