

Small Molecule Photoresists for EUV Lithography

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Primary CNF Tools Used: ASML 300C DUV stepper, ABM contact aligner, Zeiss Ultra SEM

Abstract:

We are developing novel small molecule photoresists that are compatible with the state-of-art extreme ultraviolet (EUV) lithography, and represent under 10 nm resolution.

Summary of Research:

In the Giannelis group and the Ober group, we are developing a class of novel photoresists that are small enough for the current EUV lithography [1,2]. These photoresists are small molecules that crosslink upon exposure under DUV or EUV.

We normally develop the chemistry in our labs at MSE, Cornell. Once we have got a new recipe, we expose our thin film using the contact aligner and DUV stepper at certain wavelengths in CNF. We also rely heavily on CNF SEM to check our resolution. Certain chemistry would also be evaluated for e-beam lithography, which is performed by another colleague in Ober group.

References:

- [1] Sakai, Kazunori, et al. "Development of metal organic cluster EUV photoresists." *Advances in Patterning Materials and Processes XXXVI*. Vol. 10960. International Society for Optics and Photonics, 2019.
- [2] Sakai, Kazunori, et al. "Metal organic cluster photoresists: new metal oxide systems." *Advanced Etch Technology for Nanopatterning VIII*. Vol. 10963. International Society for Optics and Photonics, 2019.

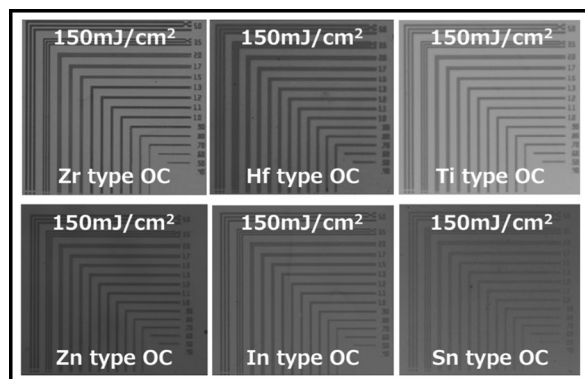


Figure 1: Micron-scale patterning results from contact aligner in CNF, of several resists.

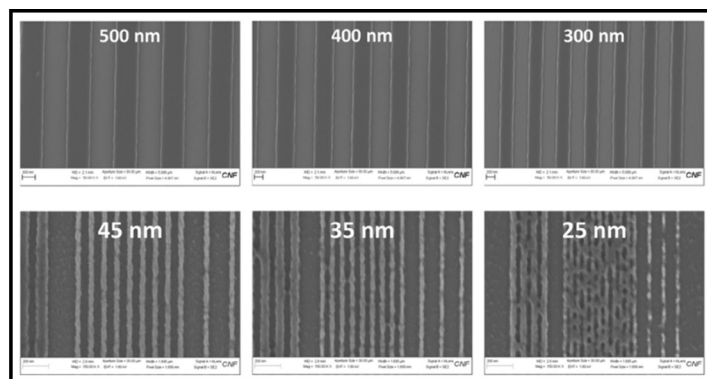


Figure 2: DUV exposure (upper), in CNF, and further evaluation using finer masks (lower) exposure one organic cluster resist.

