Supplemental Document

Single Step Fabrication Process Of Alignment Markers For Direct-Write Electron Beam Lithography In Metal-Organic Negative Tone Resist

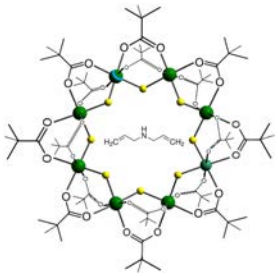

Figure 1. $[NH_2Allyl_2]Cr_7NiF_8(Pivalate)_{16}$ The structure of the molecules in a crystal, in ball-and-stick representation. Cr atoms are green, Ni atoms are green with a blue band. F atoms are yellow. H atoms are omitted for clarity.

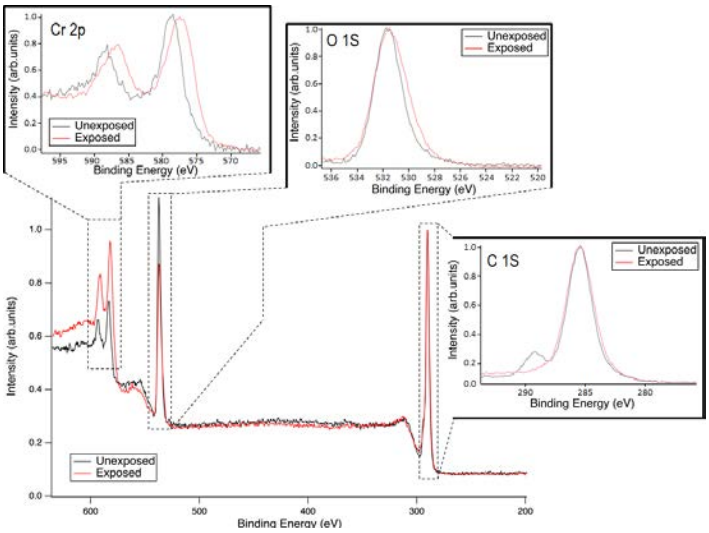

Figure 2. X-ray photoelectron spectra of $[NH_2Allyl_2]Cr_7NiF_8(Pivalate)_{16}$ resist material before and after exposure to the electron beam.

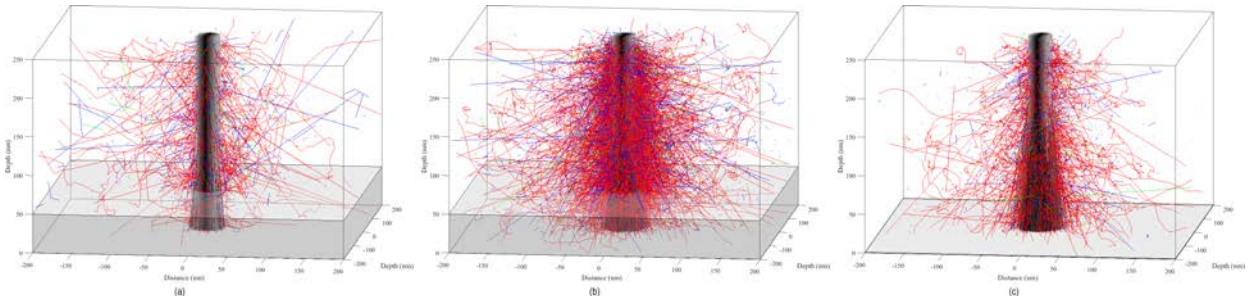

Figure 3. Point spread function of the internal electron scattering interactions inside 200 nm films of: (a) Resist; (b) CrO_x; (c) 250 nm of Silicon. The acceleration voltage is 100 KeV. The black lines represent the primary electrons from the incident beam while the secondary electrons

above 500 eV are represented by the red lines. The secondary electrons which have the associated energies below 500 eV which were generated by first, second and third order collisions are indicated purple, cyan and green. The blue lines are backscattered electrons. 1 million electrons are inserted into a single spot.

Figure 4. SEM micrograph in immersion mode of 20 micron squares fabricated directly in resist for use as alignment marks

References

1. Lewis, S. M., DeRose, G. A., Alty, H. R., Hunt, M. S., Lee, N., Mann, J. A., Grindell, R., Wertheim, A., DeRose, L., Fernandez, A., Muryn, C. A., Whitehead, G. F. S., Timco, G. A., Scherer, A., Winpenny, R. E. P., "Tuning the Performance of Negative Tone Electron Beam Resists for the Next Generation Lithography," *Adv. Funct. Mater.* (2022), 2202710. https://doi.org/10.1002/adfm.202202710