Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Information

Organic-inorganic Hybrid Photoresists Containing Hexafluoroantimonate: Design, Synthesis and High Resolution EUV Lithography Studies

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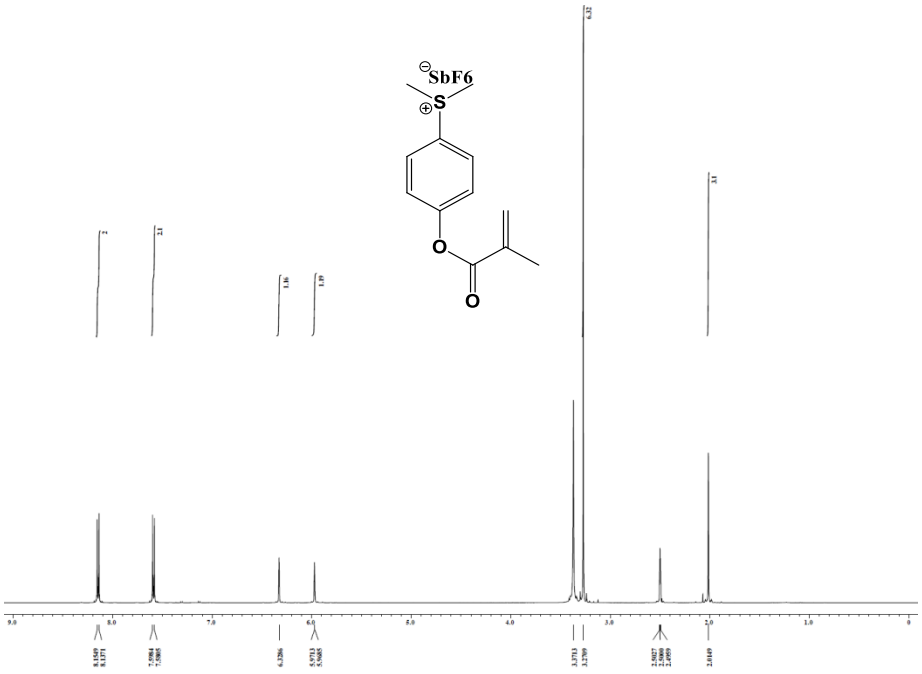

Figure S1. ^{1}H NMR of MAPDSA monomer.

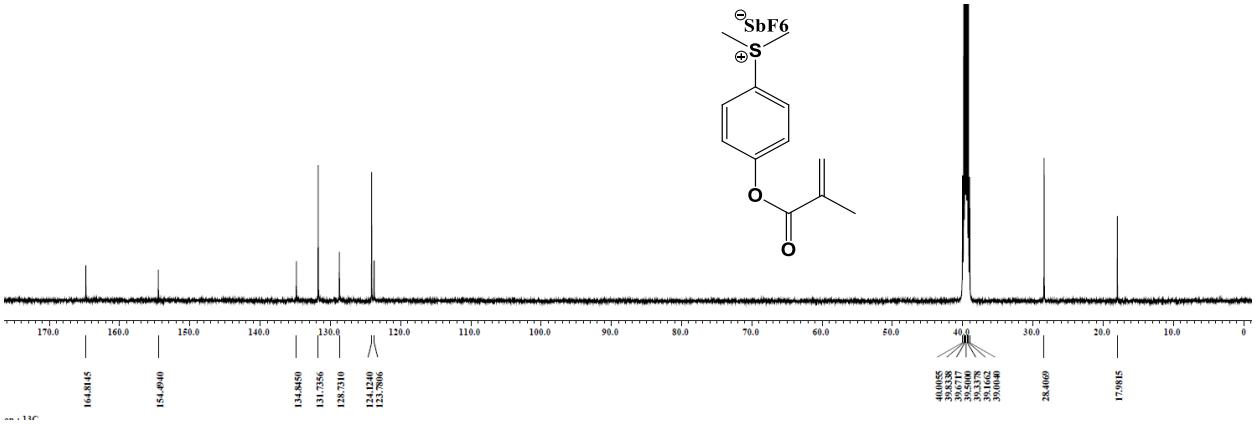

Figure S2. ^{13}C NMR of MAPDSA monomer.

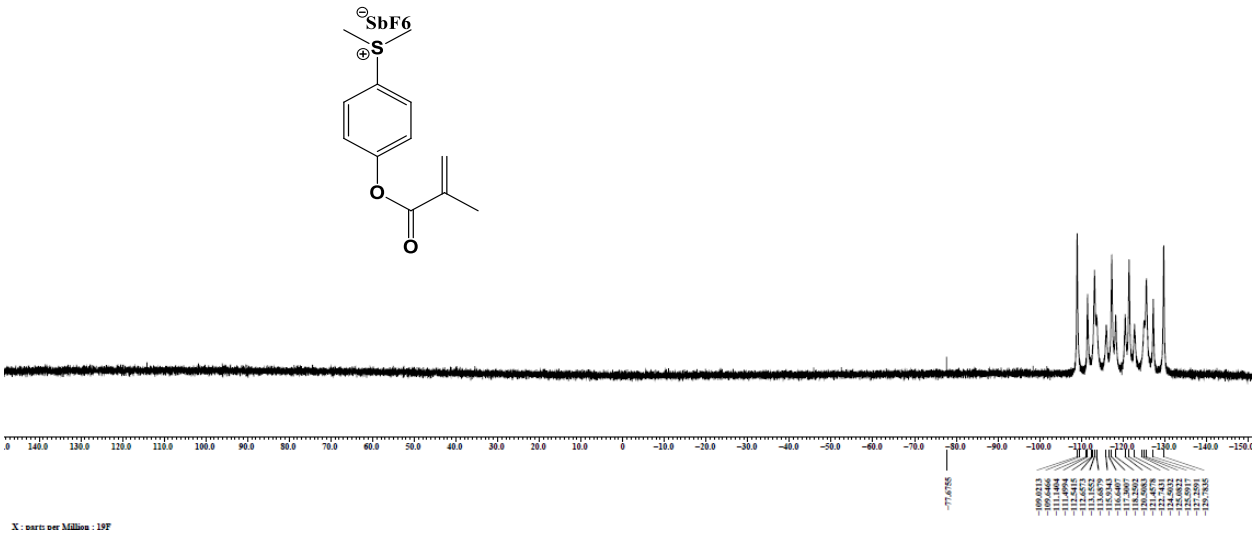

Figure S3. ^{19}F NMR of MAPDSA monomer.

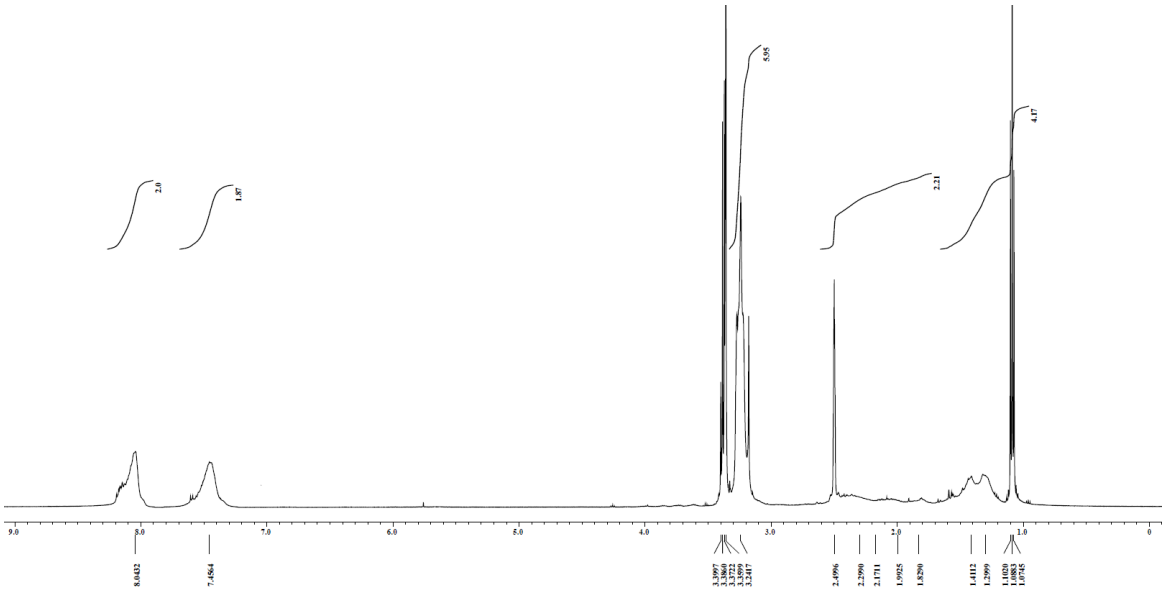

Figure S4. ^{1}H NMR of 1.5% MAPDSA-MAPDST copolymer.

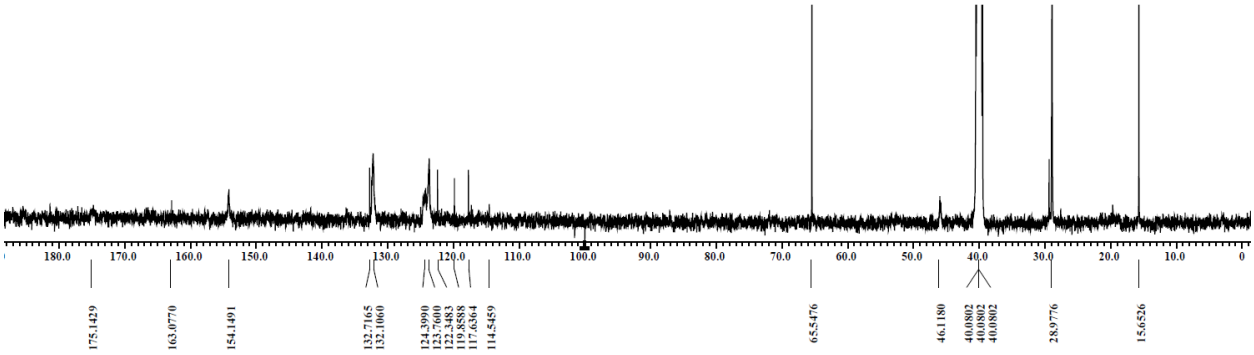

Figure S5. ^{13}C NMR of 1.5% MAPDSA-MAPDST copolymer.

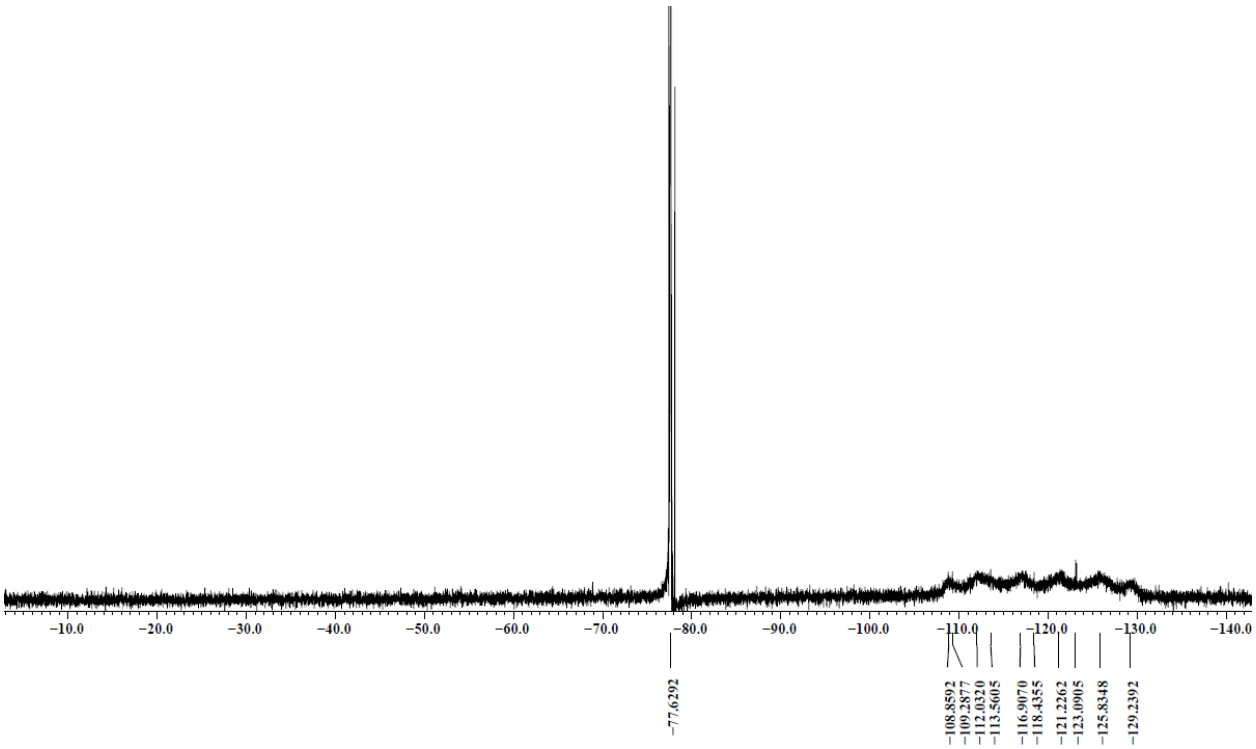

Figure S6. ^{19}F NMR of 1.5% MAPDSA-MAPDST copolymer.

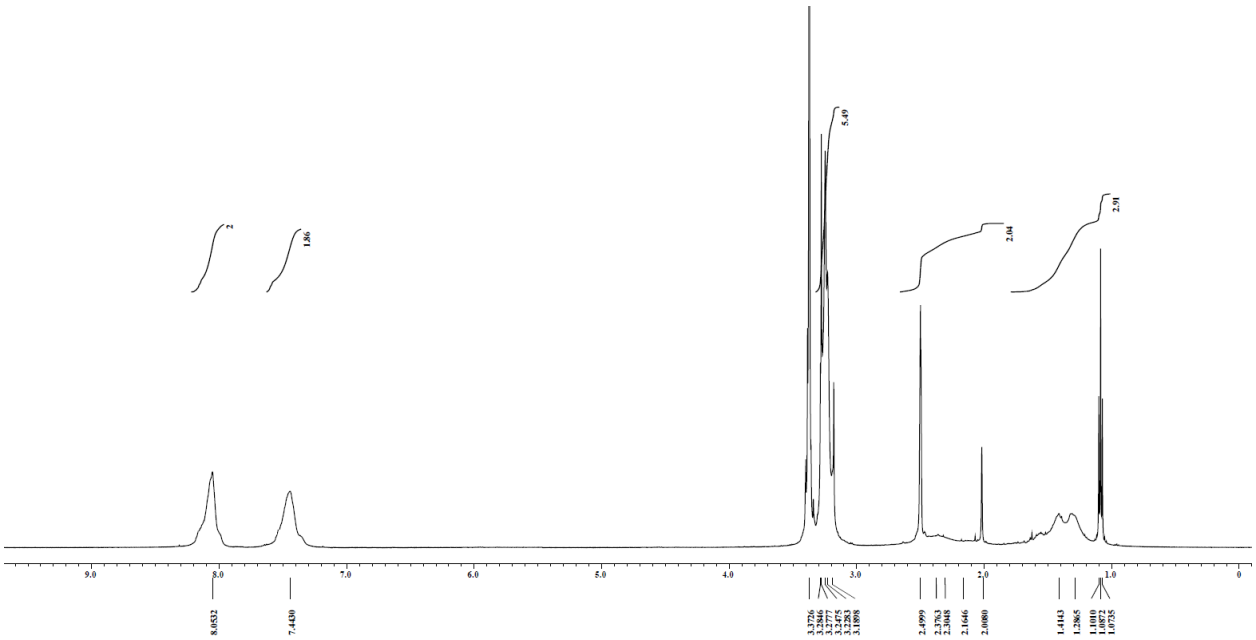

Figure S7. ^{1}H NMR of 2.15%-MAPDSA-MAPDST copolymer.

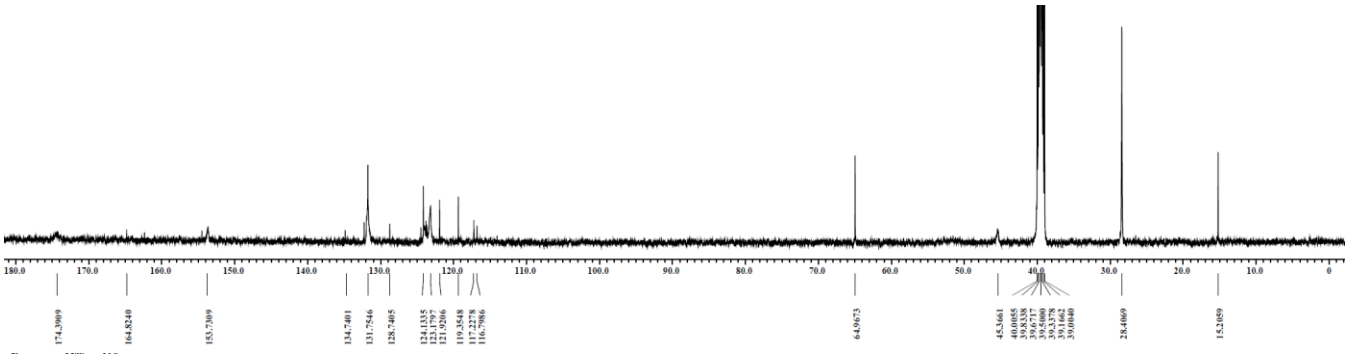

Figure S8. ^{13}C NMR of 2.15%-MAPDSA-MAPDST copolymer.

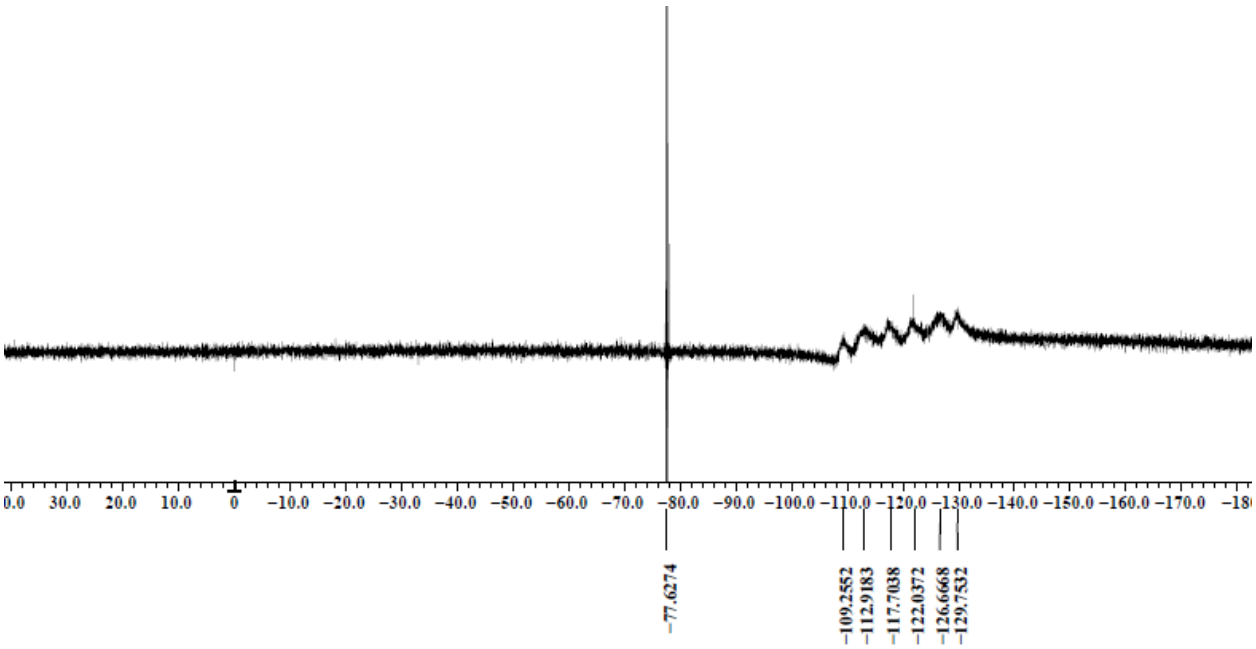

Figure S9. ^{19}F NMR of 2.15%-MAPDSA-MAPDST copolymer.

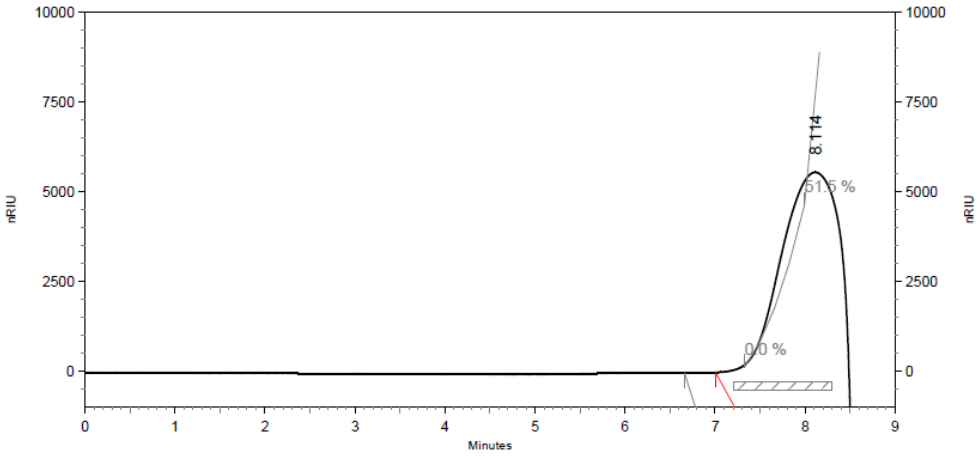

Figure S10. GPC profile of 1.5% MAPDSA-MAPDST copolymer.

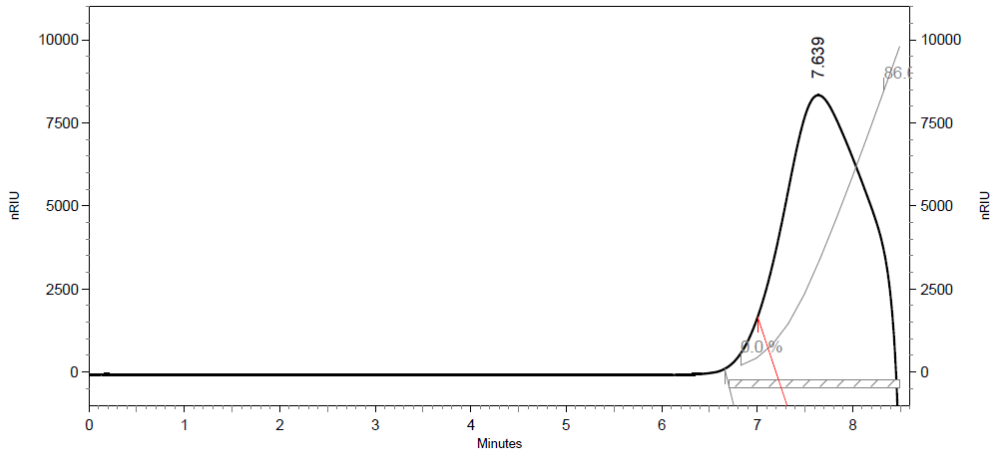

Figure S11. GPC profile of 2.15% MAPDSA-MAPDST copolymer.

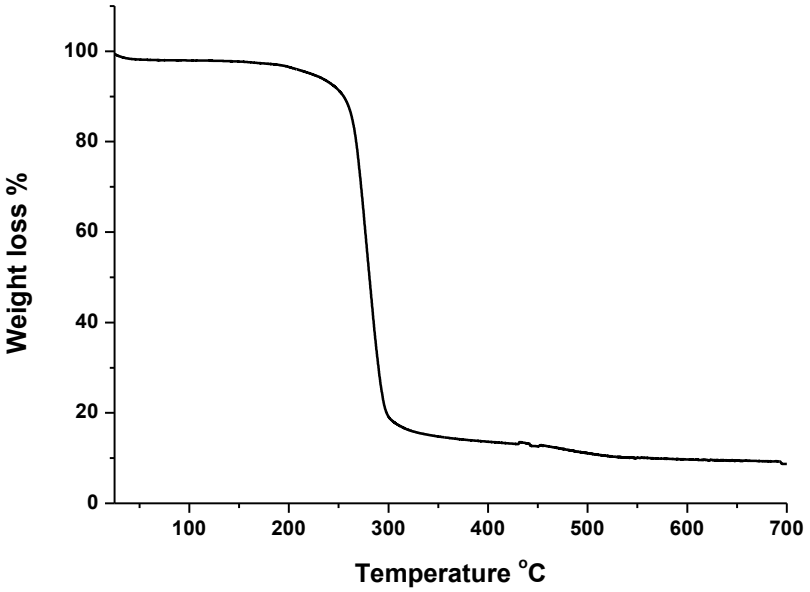

Figure S12. TGA profile of 1.5% MAPDSA-MAPDST copolymer.

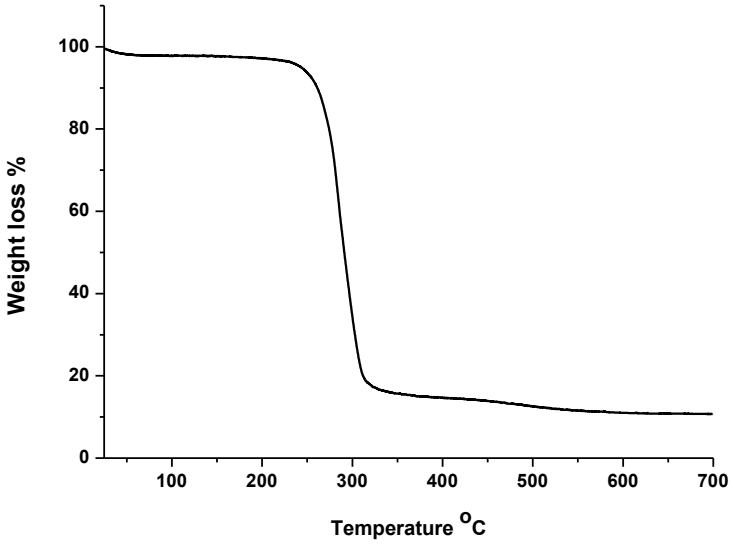

Figure S13. TGA profile of 2.15% MAPDSA-MAPDST copolymer.

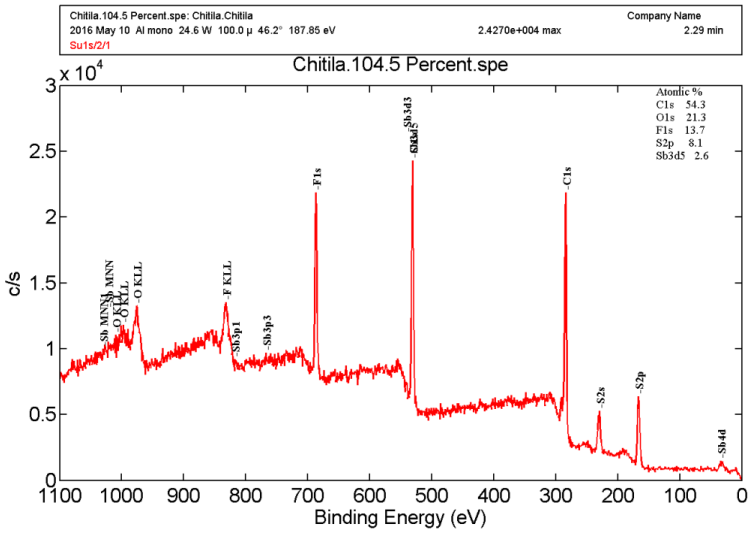

Figure S14. Area scans X-ray photoelectron spectra (XPS) profile of 1.5% MAPDSA-MAPDST copolymer.

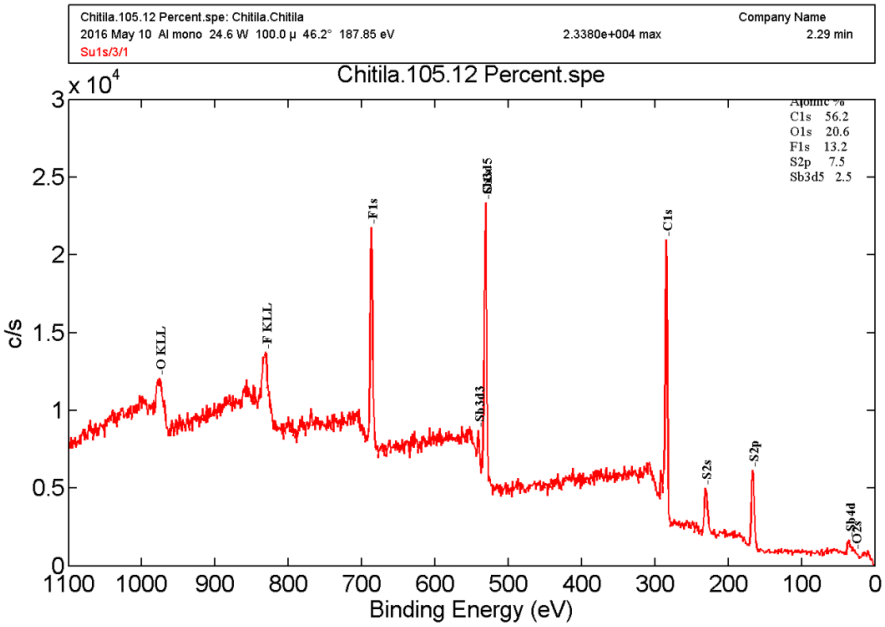

Figure S15. Area scans X-ray photoelectron spectra (XPS) profile of 2.15% MAPDSA-MAPDST copolymer.

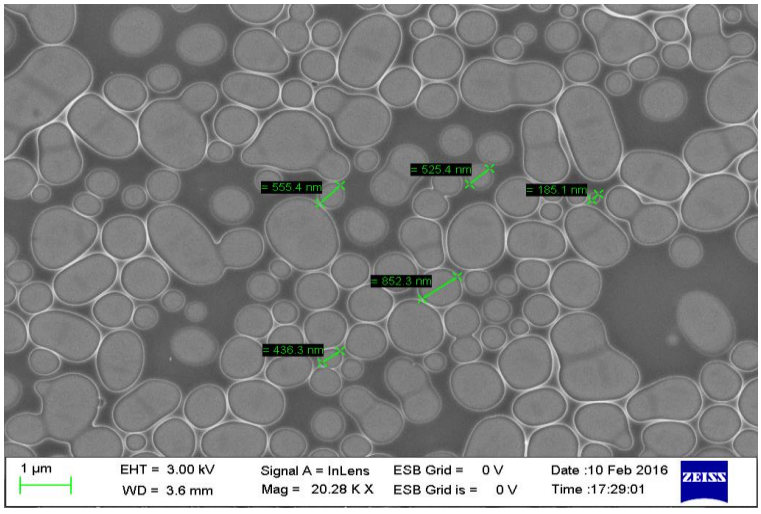

Figure S16. FE-SEM image of thin film obtained by spin coating of MAPDSA-MAPDST (50:50 feed ratio) copolymer resist in acetonitrile solvent.

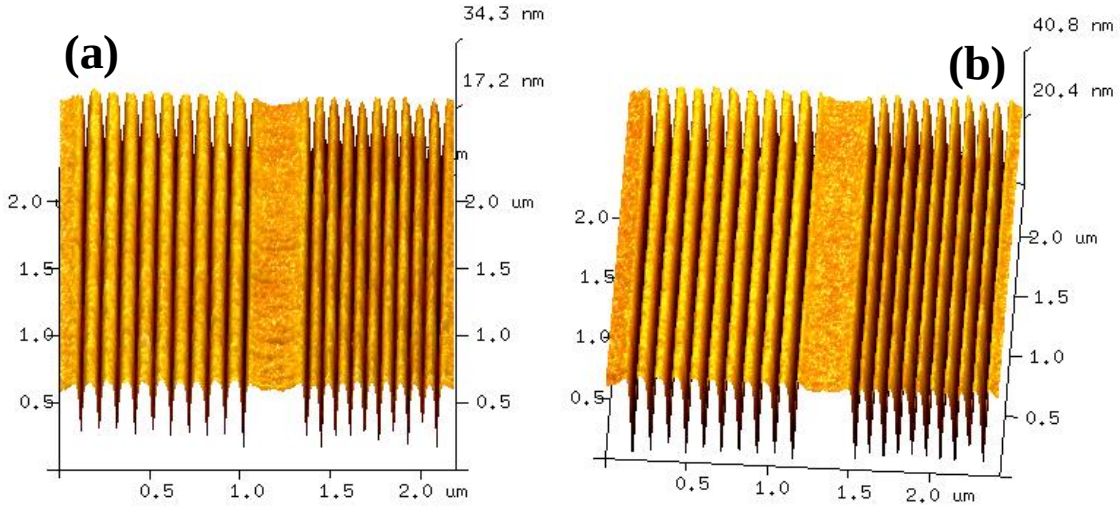

Figure S17. AFM 3-D view of EUV exposed MAPDSA-MAPDST hybrid resist patterns: (a) Higher resolution 20 nm (L/4S and L/3S) line features of 1.5 % resist; (b) higher resolution 20 nm (L/4S and L/3S) line features of 2.15 % resist.

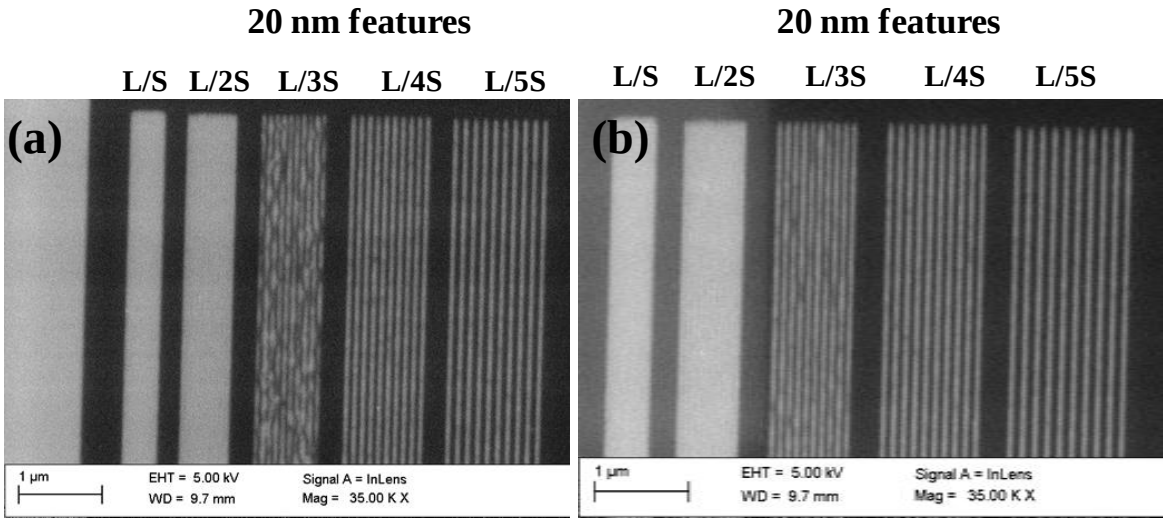

Figure S18. FE-SEM images of EUV exposed MAPDSA-MAPDST hybrid resist patterns: (a) 20 nm line features with L/S to L/5S (line/space) characteristics of 1.5 % resist; (b) 20 nm line features with L/S to L/5S (line/space) characteristics of 2.15 % resist.

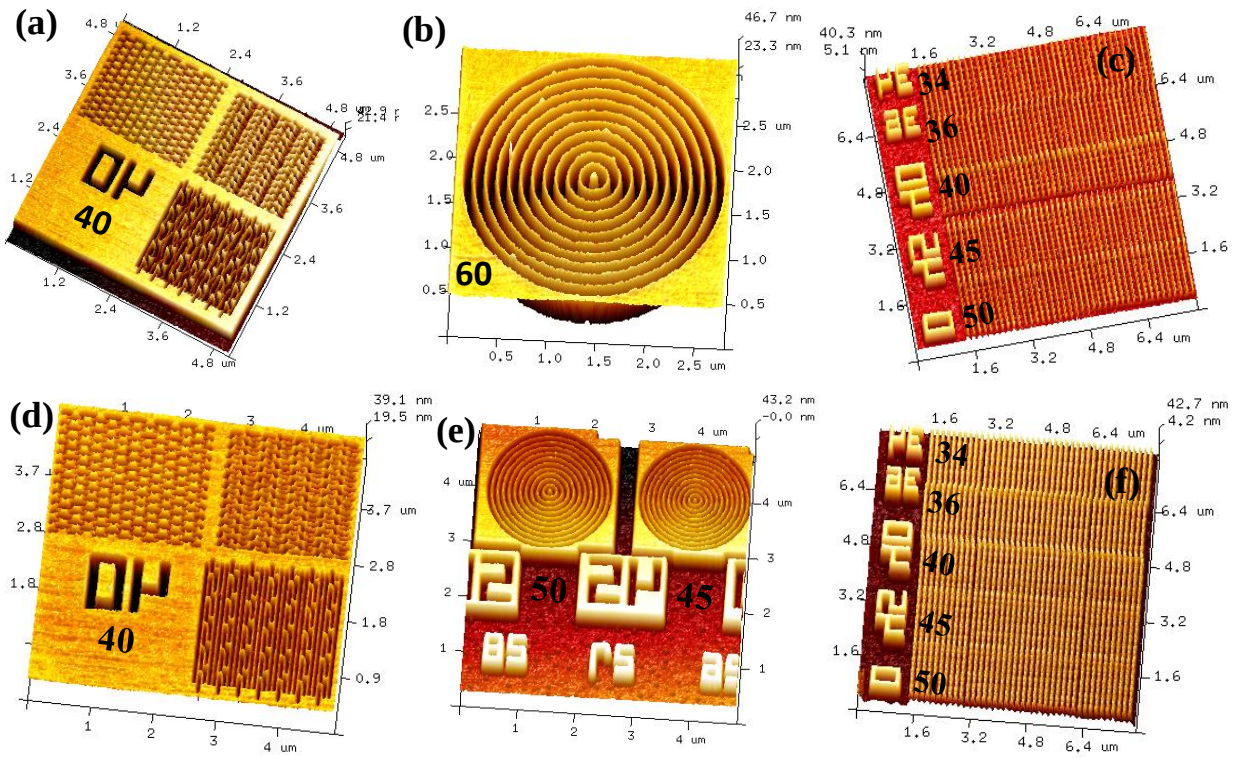

Figure S19. AFM-3D image of EUV exposed complex nano-features: (a) 40 nm boats, waves and line-elbow connections of 1.5 % resist; (b) 60 nm circular patterns of 1.5 % resist; (c) 50-34 nm dots of 1.5 % resist; (d) 40 nm boats, waves and line-elbow connections of 2.15 % resist; (e) 45 and 50 nm circular patterns of 2.15 % resist; (f) 50-34 nm dots of 2.15 % resist.

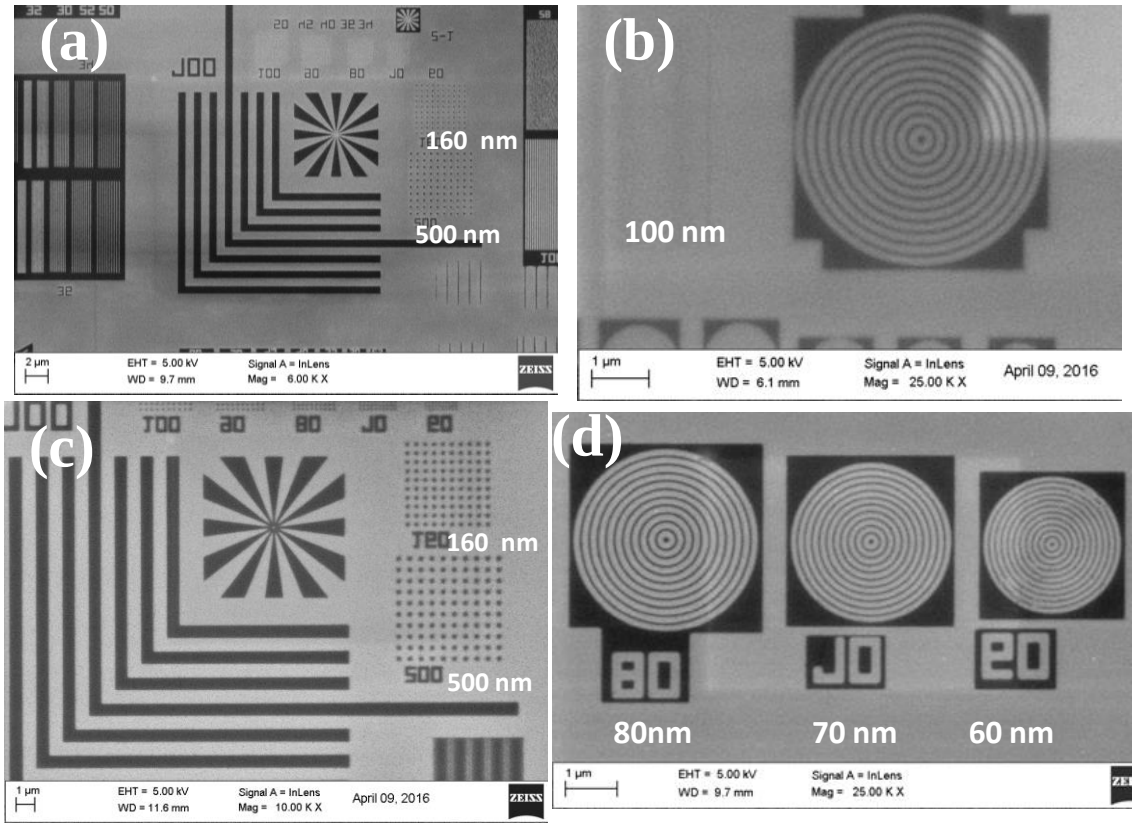

Figure S20. FE-SEM images of EUV exposed MAPDSA-MAPDST hybrid resist patterns: (a) Star elbow features with nano-dots (500 and 160 nm) of 1.5 % resist; (b) 100 nm ring patterns of 1.5 % resist; (c) Star elbow features with nano-dots (500 and 160 nm) of 2.15 % resist; (d) 80, 70 and 60 nm rings of 2.15 % resist.