Supporting Information

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

Pulikanti Guruprasad Reddy, a Pawan Kumar, b Subrata Ghosh, a Chullikkattil P. Pradeep,* a Satinder K. Sharma,* b and Kenneth E. Gonsalves* a

a School of Basic Sciences, Indian Institute of Technology Mandi, Kamand –175005, Himachal Pradesh, India.
b School of Computing and Electrical Engineering, Indian Institute of Technology Mandi, Kamand – 175005, Himachal Pradesh, India.

Corresponding Authors

E-mail: pradeep@iitmandi.ac.in; satinder@iitmandi.ac.in; kenneth@iitmandi.ac.in
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.