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Fluorinated Anionic Photoacid Generators(PAGs) & Super PAG Bound Polymer Resists for Nanolithography

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Abstract – A series of chemically amplified resists based on terpolymers of 4-hydroxystyrene and 2-ethyl-2-adamantyl methacrylate and a monomer bound anionic photoacid generator (PAG) were prepared and characterized. Based on the e-beam lithography performances, fluorinated PAG bound polymer resists were further initially investigated under EUV interference lithography: Resolved pattern sizes of 40 and 32.5 nm half-pitch were obtained for fluorinated PAGs (such as MTFB PAG and F4 PAG) bound polymer resists under EUV interference lithography. The surface roughness has also been inspected with AFM. Super anionic PAGs [super bound PAG and super blend PAG] were prepared in good yields and characterized by NMR and elemental analysis. The acid generation efficiency of super PAG bound /blend polymers were over 80%, which is consistent with the electron withdrawing power of the substituents. Based on their acid generation efficiency and DUV absorption as well as the previously reported EUVL results of F4 PAG bound polymer photoresists, these super PAGs and corresponding PAG bound polymers should be effective resists for EUV lithography. Further investigations on high resolution EBL and EUVL imaging, outgassing and acid diffusion studies will be reported.