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Hybrid photoresists based on organic metals clusters and ligands

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Hybrid photoresists were prepared based on organic metal clusters decorated with organic ligands on silicon substrates using sol-gel and spin coating techniques. The resist was spun on a silicon substrate at 3000rpm for 30 seconds and then dried at ambient condition. The size of nanoparticles and hybrid materials was measured using Zetasizer. These films were annealed at different temperatures for 30 seconds so as to remove the possible solvent on the surface and develop hybrid photoresists. The resists were exposed to extreme ultraviolet (EUV) irradiation and deep ultraviolet irradiation (DUV). The structural, thermal, molecular, elemental/compositional, morphological and physical properties of metal nanoclusters and hybrid photoresists were investigated using X-ray diffraction (XRD), Raman spectroscopy, nuclear magnetic resonance (NMR), electrospray ionization-mass spectrometry (ESI-MS), Fourier transform infrared (FTIR) spectroscopy, energy-dispersive X-ray diffraction spectroscopy (EDS), X-ray photoelectron spectroscopy (XPS), selected area electron diffraction (SAED) and field emission scanning electron microscopy. The parameters such as phase development, thermal stabilities, nature of chemical reactions, elemental/compositional analysis before and after ozone treatment, ligand cleavage under EUV exposure, surface morphology, particles size, surface area, cluster's ligands contribution to the solubility difference between exposed and unexposed areas triggered under EUV radiation, molecular weight and distribution of the different molecular species present in photoresists, mechanism of patterning EUV hybrid photoresists, lithography performances of the hybrid photoresists were evaluated using the above characterization techniques.

Biography

Davoud Dastan is a Research Associate at Georgia Institute of Technology. Prior to his appointment at George Tech., he was a Post-doc fellow at Cornell University, Ithaca, New York, USA. He is working on nanomaterials for energy applications. He has published several papers and has been serving as an Editorial Board Member of *repute*.

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