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Supercritical CO2 for Resist Development: Towards an All-Dry Lithography Process NELSON FELIX, School of Chemical and Biomolecular Engineering, Cornell University, YU (JESSIE) MAO, Department of Chemical Engineering, Massachusetts Institute of Technology, KAREN GLEASON, Department of Chemical Engineering, Massachusetts Institute of Technology, CHRISTOPHER OBER, Department of Materials Science and Engineering, Cornell University — The increased use of organic solvents, halogenated solvents, and water in manufacturing and processing of ICs has led to a need of environmentally responsible and energy efficient processes. Alternatives to the previously mentioned solvents have been researched and one possibility is supercritical carbon dioxide ($scCO_2$). It has been well established that by adding a small volume of polar solvents (also called co-solvents) to an $scCO_2$ mixture, the solubility of a polar solute in $scCO_2$ can dramatically increase. This fact makes $scCO_2$ technology extremely attractive as an alternative solvent for lithography. Various resist platforms were tested to demonstrate their ability to be developed in CO_2. These include copolymers of functionalized methacrylates or phenolics with perfluorooctyl methacrylates, homopolymers of functionalized methacrylates, and novel small molecule resists. Films were either deposited via spin-coating or hot filament chemical vapor deposition (Gleason Group, MIT). Depending on the resist system, features on the order of 100 nm were obtained after development in $scCO_2$.

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