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SCORR - Supercritical Carbon Dioxide Resist Removal CRAIG TAYLOR, JERRY BARTON, KIRK HOLLIS, JIM RUBIN, Los Alamos National Laboratory, LAURIE WILLIAMS, Fort Lewis College — Supercritical Carbon diOxide Resist Removal, SCORR, is an emerging technology that may enable the further miniaturization of photolithography processes in industry. SCORR utilizes the physical properties of supercritical fluids (SCFs) to remove coatings, residues, and particles from the high-aspect-ratio and small minimal dimension structures required in modern integrated circuits. In the SCORR process, it is the diffusion of the SCF into the polymer and the resultant swelling that is utilized to debond materials from the surface. By “tuning” with pressure, temperature and modifier the SCF is more readily absorbed into the photoresist. This plasticizes the polymer and lowers its glass transition temperature maximizing polymer swelling. Subsequent pressure “pulsing”, forces a rapid volume expansion effectively debonding the polymer from the substrate. Small amounts of modifier may be added to act at the polymer/substrate interface to further enhance debonding. To optimize the swelling and pulsing steps, a single supercritical phase needs to be maintained. The minimal interfacial tension of SCFs results in a surface boundary layer flow condition that allows the fluid to then remove extremely small particles and residue layers.

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