

Lewis University
STEM Undergraduate Research Experience (S.U.R.E.) 2019
Faculty Mentor – Project Application

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Research Project Title: Synthesis of a Biomimetic Brush for Applications in Post-CMP Cleaning

Chemical mechanical planarization (CMP) is a critical step in the fabrication of integrated circuits (ICs) for modern electronic devices. The CMP process utilizes a slurry composed of abrasive nanoparticles, among other additives, in order to remove excess material from the semiconductor substrate. While effective, slurry components can remain on the surface causing defects in the final product. Therefore, a post-CMP cleaning step is integral in removing these excess particles in order to develop efficient, high-performing ICs. Current cleaning methods use either a polyurethane pad or a poly(vinyl alcohol) (PVA) brush in conjunction with an external cleaning agent. Unfortunately, these cleaning methods may induce further defects such as particle contamination and scratching which can ultimately cause integrated circuit device failure. In order to limit the amount and detriment of these defects, a novel brush will be developed using biomimetic materials such as cellulose and alginate. By incorporating known cleaning agents within the brush matrix, it will become a self-contained cleaning system for efficient cleaning of ICs. Initial results have shown that the overall particle defectivity is reduced by 55% and the surface topography measure by atomic force microscopy is greatly improved with respect to roughness and scratch counts.