Filtration and Biotreatment Scheme to Recycle CMP Wastewater

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Several studies have demonstrated that copper chemical mechanical planarization (Cu-CMP) wastes can be treated and disposed of safely according to regulations. Towards that effort, Ogden and co-workers (Stanley & Ogden, 2003) developed a biosorption/biotreatment scheme to remove copper and organics from Cu-CMP wastes. Biosorption treatment employed indigenous *Soil 5Y Staphylococcus sp.* bacteria to grow biofilms on glass beads. This study focuses on combining biotreatment and filtration into a filtration/biotreatment scheme to remove both nano-particle abrasives and copper from the wastes with the overall objective recycling CMP wastes. Biosorption data have elucidated upon various techniques for 5Y bacteria growth by utilizing biocarriers and through bioaccumulation. Characterization studies have indicated that multiphase-multicomponent interactions are at play due to presence of nano-particles abrasives and copper. It was found that copper adsorbs onto alumino silicate nano-particles on almost 45-55 percent basis. It is imperative to remove nano-particles to lessen particle fouling of the biosorption process or to simultaneously remove both copper and nano-particles.

Water recycling in the microelectronics and biotechnological industries is the future overall goal of environmentally benign processing. Not only are large volumes of water potentially recyclable, but it economically justifies investment and further studies in efficient treatment schemes.