

## Challenges in Filtration for Post CMP Cleaning Chemistries

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Post CMP cleaning process removes slurry particles on the wafer surface after the CMP planarization process. Complete removal of slurry particles is critical for yield enhancement, since the residual slurry may introduce foreign particles and metal contaminants that are undesirable for further IC processes <sup>1</sup>. Current technology for post CMP cleaning process uses megasonic immersion and double sided brush scrubbing for the removal of slurry particles. In both of the post CMP cleaning steps, different chemistries are applied to enhance removal of slurry particulates and metal contaminants. These chemistries are specifically targeted at the zeta potential and dissolution of particles on wafer surfaces to enhance particle removal, dissolution and suppress redeposition.

Post CMP cleaning chemistries are diluted with DI water at the point of use and therefore require filtration to protect the solution from contamination with large particles that scratch wafers. It is critical that the filtration does not modify the chemistries in the post CMP cleaning process since it will affect the removal rate of slurry particles in both of the cleaning steps. The graph in figure 1 below shows the plot of surface tension versus filtered volume of a commercially used post CMP solution for Cu CMP process containing organic acid with surfactants. Upon filtration with surface modified 0.05um pore size UPE membrane filters; there is a slight physical adsorption of surfactants on the membrane; noticed by increased surface tension of filtered chemical. After a gallon of filtration, the surface tension of the chemical drops to its original unfiltered state indicating there is no adsorption of surfactants. Similar results are seen in the UV-Vis spectrum of this chemical in Figure2. The absorbance peak at the very beginning shows decrease in peak height relative to original solution indicating some absorbance of organic constituents and returns to saturation around a gallon of filtration.

The paper will demonstrate Entegris surface modified hydrophilic UPE membranes filters are compatible for filtering post-CMP chemicals presently used in

semiconductor manufacturing processes and the filters do not modify their chemistries. The paper will discuss the experimental results on the chemical compatibility, integrity of the post CMP chemistry and the retention performance of these filters.

**Figure1: Surface Tension**

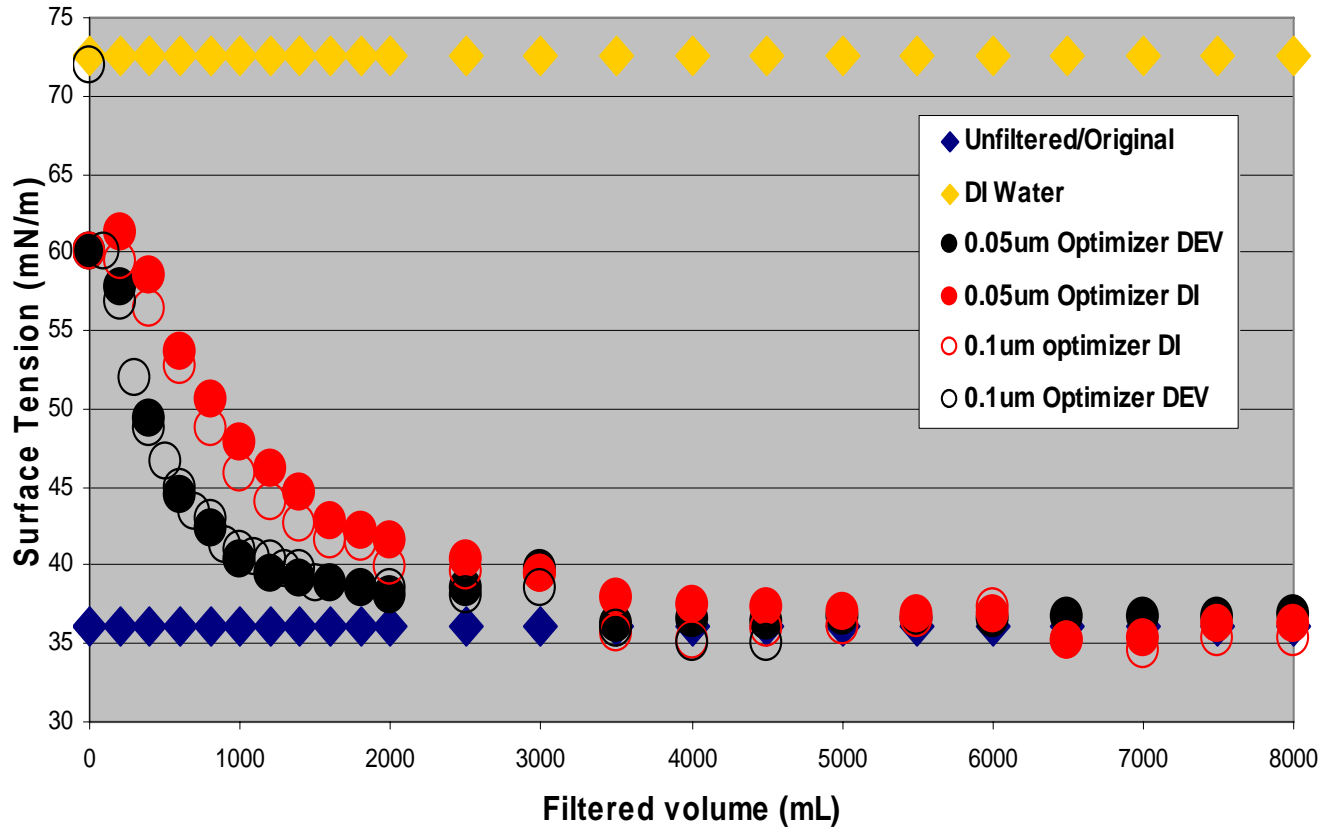
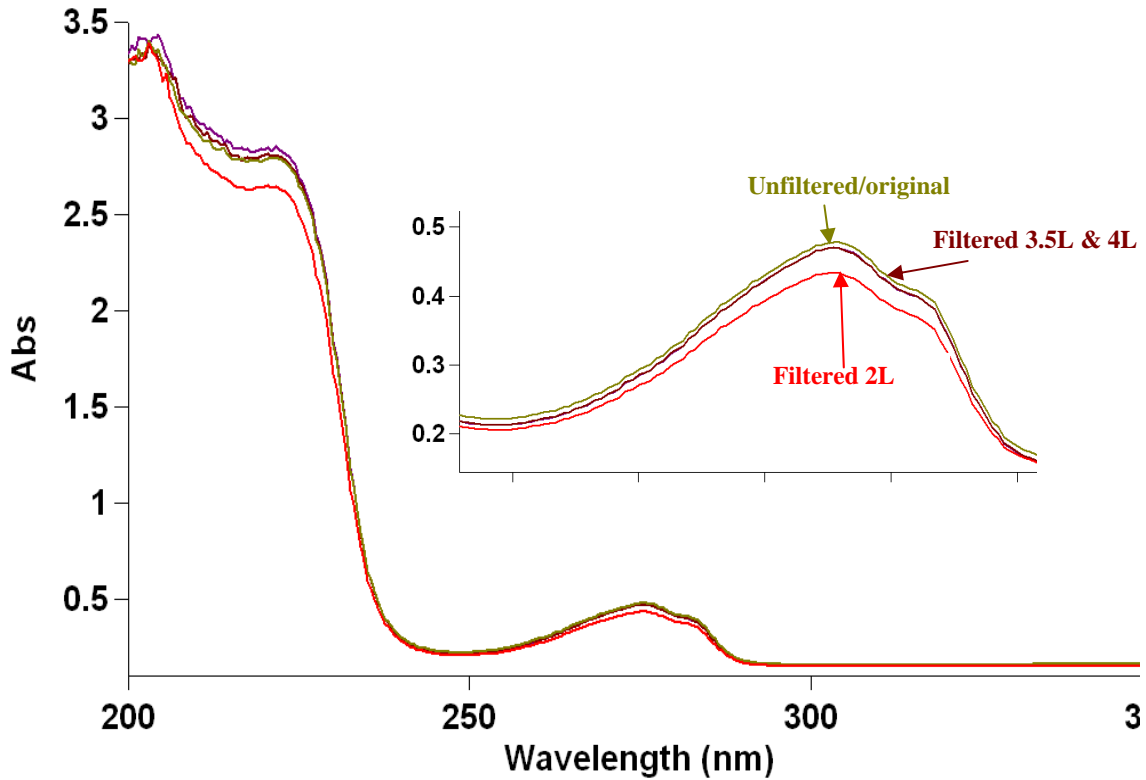


Figure 2: UV-Vis spectrum



**Biography:**

Mufadal Ayubali (Ali) joined Entegris' EMC (Entegris Microcontamination Control) business in 2006. He has earned a Bachelor of Science in Microelectronic Engineering and a Master of Science degree in Chemistry from the Rochester Institute of Technology in Rochester, New York. He is presently focused on media and membrane research and development in the Analytical and Product Evaluation Group in Billerica, MA, USA.