The influence of the selectivity in a 2nd step slurry for a Cu CMP process.

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Since the introduction of copper material for the interconnection on ICs, a damascene approach is used for the metal deposition. In the CMP step for copper damascene structures, most approaches are using a two step process. In the first step the Cu bulk is removed and the copper slurry stops on the underlying TaN barrier. In the second step the TaN barrier is removed. For this second step we can use a selective slurry towards copper and hardmask or a nonselective one, which polishes Cu, TaN and hardmask at the same rate. The first approach is expected to result in lower copper loss, the last approach is expected to result in better planarity. In this study the planarity and copper loss is quantified as a function of the selectivity of the slurry. Data will be presented on the difference between a high selective and a nonselective barrier slurry in Cu CMP. The influence of different overpolish times on dishing and erosion will be quantified as a function of line width and pattern density across the wafer. The total copper loss calculated out of the step height and oxide loss measurements will be compared with electrical data.