Title: Process Improvement using a Response Surface Methodology Experiment (RSM) for Chemical Mechanical Polish (CMP) Nonuniformity Reduction

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Abstract:

The DMOS5 Wafer Fab at TI had to reduce cost, improve yield and qualify a more consistent slurry for Copper CMP processing. The goal was to qualify a slurry with improved process performance by decreasing defects while improving tool throughput. Also a major problem is quality of incoming material from the current vendor costing thousands of dollars in wasted resources because of incoming variability and low production moves.. In switching, we wanted to guarantee equivalent or improved performance on thickness, non-uniformity, and removal rate. Doing so involved simultaneously optimizing two dependent variables. Although the slurry provider supplied their best known recipe (BKM), we wanted to optimize the CMP recipe for our particular equipment and consummables. We used JMP software to generate two possible Response Surface Methodology (RSM) experimental set ups. Both had three blocks. We used the Central Composite design. The results were favorable and provided a path of steepest descent, which we followed to obtain an optimal polish recipe.

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