586e Characterization of Copper Chemical Mechanical Polishing in Nitric Acid Slurries

Moganty Surya Sekhar and S Ramanathan

Copper Chemical Mechanical Polishing was investigated in fumed silica slurries containing Nitric acid and Hydrazine. CMP studies and static etch data were reported for the 1 inch X 1 cm electrochemical grade copper discs. CMP experiments were carried out using the Struers LaboPol-5 and LaboPol-3 CMP tool. Hydrazine was found to be an effective inhibitor even in presence of concentrated nitric acid. Polish rate was decreased with the addition of hydrazine to the nitric acid slurry. Electrochemical interactions involved during polishing were elucidated by both ex situ and in situ electrochemical studies using Princeton Applied Research potentiostat. Ex situ electrochemical studies were carried out in a three electrode cell. Electrochemical interactions between the chemicals and copper were investigated by comparing the ex situ and in situ electrochemical experimental results. Tafel plots and open circuit potentials were used to elucidate the inhibiting role played by the hydrazine in nitric acid slurries. Electrochemical impedance spectroscopic results were modeled to the equivalent electrical circuit diagrams to envisage the relative roles played by the both chemicals on the copper surface. Atomic Force Microscopic measurements were performed on the polished copper surface. It was found that the surface roughness decreased with the addition of the hydrazine.