



## **GOI Evaluation for Surface Defect and Contamination in CMP Process**

**Jongyoung Cho, Kijung Kim, hangji Han and Hyungsoon Park\*, 1 Division of Research and Development, SK hynix**

As a design rule of memory device shrink, analysis and identification of sub -10nm defect is more and more important. Conventional surface characteristics such as micro-topology, metallic contamination after chemical mechanical planarization (CMP) process were measured by atomic force microscopy (AFM), X-ray photoelectron spectroscopy (XPS), and inductively coupled plasma mass spectrometry (ICP-MS) technics et al. However, these surface analyses have problems such as ex-situ process, and directly not matches electric properties (leakage current, contact resistance etc.) with focus on local area in memory devices. Therefore, we compared the break-down voltage (BV) of oxide film for three different slurries to know the direct effect of W CMP slurries using gate oxide insulator (GOI) pattern.

We performed CMP process of three different slurries as slurry A (fumed slurry), slurry B (colloidal slurry with additive B) and Slurry C (colloidal slurry with additive C) using GOI short patterning wafer, and then measured I-V curves and evaluated the break-down voltage (BV) value with these different slurries. The decrease trend of BV are as follows: Slurry C > Slurry B > Slurry A. It indicated the degradation of BV for Slurry A containing fumed abrasives is higher than the others with colloical abrasives. The lower tendency of BV matched to the RMS roughness caused by micro scratch on GOI film. We thought that the micro-scratch in case of a fumed silica slurry (Slurry A) affect lowering the BV characteristics than that of colloidal slurries (Slurry B and C). Furthermore, we evaluated the leakage current behavior of I-V curve and then matched the metallic contamination with different slurries having different abrasive-type and additives.

We think that the electric analyis using GOI short pattern is speed and accurate tool to match the CMP performane of slurry and CMP cleaning chemicals.