Chapter 4
Conclusions

For the Cu-CMP, we studied various organic acid formed the slurries. In the neutral slurry, the corrosive behavior of copper in the neutral condition would be easily affected by pH, so there were two different corrosive behaviors shown in figure 2-2, which would form Cu_2O and $Cu(OH)_2$. Therefore, the composition of slurry as far as controlled in the weak acid condition. Different organic acids would be used as oxidizer in the slurry, although the slurry contained the same colloidal aluminum oxide and the pH of the slurry would be fixed at pH=4, but the IEP of the abrasive would be changed because the abrasives in the different slurry formed different EDL on the surface of the abrasives, and then the abrasives in the different slurry would be different IEP and secondary particle size. Finally, we found that the 0.3um abrasives would easily form the scratches than 0.05um abrasives to agree with the roughness.

For the W-CMP, we diluted the slurry and then we made the electrochemical experiment. Finally, we made the via chain structure to agree with the other experiments. At first, we could find when we used six times dilution ratio the polishing rate were the lowest. When we used the maximum hydrogen peroxide the polishing rate were the highest but the uniformity would become larger. In the electrochemical results, we could find that when hydrogen peroxide added in the

slurry, the corrosion current would violently increase. We could conclude that the polishing rate would be controlled nearly by chemical etching, so we found the electrical evaluation with hydrogen peroxide or without hydrogen peroxide which would affect the surface oxide. With hydrogen peroxide in the slurry, there would be a merit on the RC time delay but the surface would more rough, so we must trade it off.

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