

## Interaction of suppressor additives with Cu seed: Electrochemical, XPS, SEM and AFM results.

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In growth of Cu film by electroplating, there have been interests in the properties depending on the variation of composition of the plating electrolyte and/or organic additives. In this study, we investigated the characteristics of electroplated Cu films according to the variation of concentration of suppressor among organic additives. The plating concentrations of electrolyte( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ,  $\text{H}_2\text{SO}_4$  and  $\text{HCl}$ ) and organic additives (accelerator and leveler) were fixed. The content of suppressor was changed from 0 to 3 mL/L. The substrate was Cu (20 nm) / Ti (20 nm) / p-type Si (100). Cu seed layer was deposited onto substrate by electron-beam evaporation. Potentiostatic electro-depositions were carried out using a conventional three terminal method, with an Ag/AgCl reference electrode, a Pt plate as a counter electrode, and the aforementioned Cu seed layer as a working electrode. Plating voltage was -0.3 V for 600 sec at room temperature. The resistivity was measured with a four-point probe and the material properties were investigated with AFM, FE-SEM and XPS. From these experimental results, we found that a suppressor plays an important role in Cu film growth. Finally, we found that suppressor acts on the film deposition rate and the properties; the decrease of deposition rate by suppressor results in the decrease of surface roughness, consequently, the electrical resistivity of film is made lower.