

Effect of Process Variables on the Properties of Electrodeposited CoWP Films

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Cu interconnection in ULSI has some advantages over Al interconnection because of higher electrical conductivity of Cu. Cu, however, diffuses into the silicon which results in defects. Therefore, a barrier layer for Cu line has been proposed to stop its diffusion. It has been claimed that CoWP thin films have superior barrier property. In this work, a CoWP barrier layer has been electrodeposited. The deposition has been carried out from an electrolyte containing CoSO_4 , Na_2WO_4 , NaH_2PO_2 and tri-sodium citrate and a three-electrode assemble was used for the deposition.

It is found that pH of the electrolyte plays an important role to determine the composition of the plated CoWP films. Co content is the highest at near neutral pHs. It is because of lower current efficiency of Co in acidic solution. At higher pHs Co^{2+} trends to form hydroxide. It is also found that the thickness of the films varies with electrolyte pH. At around neutral pH the thickness is highest which is also because of the related current efficiency. XRD and SEM examinations reveal the microstructural and morphological differences among the samples deposited at various pH values.