

### Depth profiling of copper deposited by electroless plating

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In ELD process, it requires the novel metal seed layer as a catalyst because copper is hardly electroplated directly on barrier layer TaN and TiN. Therefore, various deposition techniques such as acid solution, sputtering, MOCVD, and ionized cluster beam (ICB) have been proposed for the preparation of a thin metal seed layer for catalyst. However, with the shrink in dimensions of interconnections, it is getting more and more difficult to form a continuous sputtered the metal seed layer at side walls of fine holes, which results in voiding during electroless plating. In this work, we investigated Cu deposition in the electroless bath on various substrates. Palladium has been recently deposited on the copper barrier via atomic layer deposition and it is also an appropriate catalyst for the electroless deposition of copper. For the copper electroless process, ethylenediamine-tetraacetic acid (EDTA) was used as a chelating agent, glyoxylic acid as a reducing agent, and additional chemicals such as polyethylene glycol, 2,2'dipyridine and Re-610 as surfactant, stabilizer and antifoaming agent respectively.