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Preparation of Metallic Cu Thin Films by MOCVD Using Novel Organometallic Cu(II) Precursors

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Copper has been intensively studied as an alternative interconnecting metal to aluminum for the application of deep sub-micron ULSI circuits due to its low resistivity and high electromigration resistance. In general, CVD process is preferred to PVD process for the conformal deposition of the thin film onto the trenched structure with a high aspect ratio. Among various precursors for Cu CVD, β -diketonates containing Cu precursors such as Cu(thd)₂, Cu(hfac)₂ and Cu(hfac)(vtms) have been predominantly employed to produce copper thin films, which was often contaminated with carbon and fluorine. In this presentation, we describe the synthesis of highly volatile novel copper complexes with donor-functionalized alkoxide ligands and their application as precursors to MOCVD of copper thin films in the absence of external reducing agents. Metallic copper thin films have been deposited at the temperatures of 180-250 °C by MOCVD using the novel precursors, Cu(DMAMP)₂ and Cu(DEAMP)₂.