

Metal-Organic Chemical Vapor Deposition (MOCVD) Process Investigation for Co Thin Film as a TSV Alternative Seed Layer

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Abstract : This investigation aims to develop the feasible and qualitative process parameters for the thin films fabrication into ultra-large through-silicon-vias (TSVs) as vertical interconnections. The focus of the study is on TSV metallization and its challenges employing new materials for the purpose of rapid signal propagation in the microsystems technology. Cobalt metal-organic chemical vapor deposition (Co-MOCVD) process enables manufacturing an adhesive and excellent conformal ultra-thin film all the way through TSVs in comparison with the conventional non-conformal physical vapor deposition (PVD) process of copper (Cu) seed layer. Therefore, this process provides a Cu seed-free layer which is capable of direct Cu electrochemical deposition (Cu-ECD) on top of it. The main challenge of this metallization module is to achieve the proper alternative seed layer with less roughness, sheet resistance and granular organic contamination (e.g. carbon) which intensify the Co corrosion under the influence of Cu electrolyte.

Keywords : Cobalt MOCVD, direct Cu electrochemical deposition (ECD), metallization technology, through-silicon-via (TSV)

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