

Electro-Electroless Deposition for Microelectronics and Energy Conversion

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This presentation consists of two parts. First, we discuss our research on copper electroplating for interconnect formation of integrated circuit. Electroplated copper is widely used in fine-pattern wiring due to its ability to preferentially deposit from the bottom of micro vias. In recent 3D integration technologies, copper electroplating is essential for through-silicon via (TSV) formation. However, the underlying mechanism that drives bottom-up filling remains poorly understood. We introduce our latest efforts to unravel this phenomenon.

Second, we present our approach to developing miniature fuel cells. Fuel cells offer high energy conversion efficiency regardless of size, making miniaturization a promising direction. In parallel, we explore the use of biomass-derived hydrogen to contribute to CO₂ reduction. To achieve these goals, we are developing high-performance catalytic layers integrated with silicon substrates, using porous silicon and metal plating techniques. This talk will highlight our progress in this area.