The Metallization Routing to Two Trillion Dollars

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Advancements in metallization and interconnect technology are crucial for enhancing performance, power efficiency, and scaling in modern semiconductor devices. This talk, from the perspective of a wafer processing equipment supplier, will delve into the evolution of materials and processes that enable next-generation interconnects. It will cover shifts to metals like cobalt, ruthenium, and molybdenum, as well as changes in integration and packaging with backside power and subtractive metallization. The discussion will also include advancements in metal deposition techniques such as area-selective deposition (ASD), new electrochemical processes, and pulsed laser deposition (PLD), addressing challenges in resistance-capacitance scaling, reliability, and specialty applications. Additionally, cost-effective pitch scaling through the transition from wet to dry resist processes will be described. By bridging material science and equipment engineering, this talk will highlight the importance of collaboration across the semiconductor ecosystem to achieve the performance, manufacturability, and sustainability required for future advanced nodes