

Abstract Submitted
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Schottky Barrier Heights in low-k dielectric/Cu Interconnects as Determined by X-ray Photoelectron Spectroscopy MARC FRENCH, MILT JAEHNIG, MARKUS KUHN, BENJAMIN FRENCH, SEAN KING, Intel Corporation — In order to understand the various possible leakage mechanisms in low-k/Cu interconnects, a knowledge of the basic band alignment between Cu and low-k dielectric materials is needed but has gone largely unreported. In this regard, we have utilized X-ray Photoelectron Spectroscopy (XPS) to measure the Schottky Barrier at interfaces of importance to Cu/low-k interconnects. Specifically, we have utilized XPS to determine the Schottky Barrier at the interface between Cu and low-k SiCN capping layers deposited on Cu via Plasma Enhanced Chemical Vapor Deposition (PECVD). We have also utilized XPS to determine the Schottky Barrier at interfaces between Ta barrier layer materials and low-k SiOC:H ILD materials and the valence band alignment at low-k SiCN:H/SiOC:H interfaces. Lastly, the impact of various plasma surface treatments on the band alignment at these interfaces was also investigated. The cumulative results indicate that electron transport along the SiCN:H/SiOC:H may represent the lowest energy barrier path for line-line Schottky emission based leakage.

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