

“Characterization of porous ULK SiOCH and impact on signal propagation for on-chip interconnects of the 45 nm node”

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Abstract – As the dimensions scale down aggressively into the nanometer regime at each new technology node, interconnects parasitics, which play an important role in determining the IC performance, need to be reduced as much as possible. New materials such as ULK dielectrics are thus required but these porous materials are very prone to damage during integration, degrading their K-value in the final circuit, but also severely increasing their loss tangent. In order to clearly identify these effects, high-frequency measurements associated to electromagnetic 2D simulations were performed on HF “micro-strip” interconnects with various feature sizes of 100 nm to 150 nm, showing the importance of dielectric loss which has to be precisely taken into account in order to accurately model the propagation effects for the 45 nm node. Time-domain extraction of delay and crosstalk values, using several driver characteristics, is then performed and allows a complete analysis of moisture uptake effects looking at a performance point of view.