Integration Film Scheme for Copper/Low-K Interconnect

ABSTRACT OF THE DISCLOSURE

A structure for a multi-level interconnect inter-level dielectric layer (ILD), a method of manufacturing thereof, and a semiconductor device including the ILD layer. The ILD layer includes a first low-dielectric constant material sub-layer, and a second low-dielectric constant material sub-layer disposed over the first low-dielectric constant material sub-layer. The second low-dielectric constant material sub-layer has at least one different material property than the first low-dielectric constant material sub-layer. A third low-dielectric constant material sub-layer is disposed over the second low-dielectric constant material sub-layer, the third low-dielectric constant material sub-layer having at least one different material property than the second low-dielectric constant material sub-layer. The first, second and third low-dielectric constant materials sub-layers are preferably comprised of the same material, deposited continuously in one or more deposition chambers while the deposition conditions such as the gas flow rate, power, or gas species are adjusted or changed.

(FIG. 1)