

## Evaluation of ultra low dielectric constant SiOC(-H) thin films for advanced interconnects

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The International Technology Roadmap for Semiconductors (ITRS) predicts that continued scaling of devices will require ultra low dielectric constant materials with  $k$  values less than 2.5 for 100 nm technology node and beyond. There are a number of requirements for the new low- $k$  materials, such as low dielectric constant, thermal stability, being electrically insulating, high mechanical strength and good adhesion to neighboring layers. Among the various low- $k$  materials, carbon doped silicon oxide is one of the best candidates for the use of inter layer dielectrics. In this paper, we present our experimental results of the low dielectric constant SiOC(-H) thin films deposited on  $p$ -type Si(100) substrates by using plasma enhanced chemical vapor deposition (PECVD). The detailed characterizations, such as chemical structure, refractive index, mechanical and dielectric constant of the SiOC(-H) films were evaluated. The FTIR and XPS results suggested that the formation of the C-C and Si-C related bonds due to the abundant incorporation of the carbon atoms in to the Si-O-Si network. The dielectric constant of the SiOC(-H) film was evaluated by C-V measurements using metal-insulator-semiconductor (MIS), Al/SiOC(-H)/ $p$ -Si(100) structure.