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Low-k thin film interface studies by using second harmonic generation

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As microelectronic circuits become smaller, the connections between the transistors limit the circuit performance rather than the devices themselves. In order to decrease the capacitance between wires, it is necessary to reduce the dielectric constant of an interlayer dielectric (ILD) film. So, there is driving demand for researchers to develop the new materials with low dielectric constant to solve the shortcomings in ultra-large scale integration (ULSI). Here, we report the optical characteristics in response to the metal-insulator-semiconductor structure of the low dielectric constant SiOC(-H) films. The SiOC(-H) thin films are deposited on p-Si(100) substrates by using plasma enhanced chemical vapor deposition (PECVD) system with different experimental parameters. The SHG experiments are performed with a Q-switched Nd:YAG laser at 1064 nm with a pulse duration of 8 ns, maximum average power of 9 W and energy of approximately 5 mJ/pulse is used as the fundamental radiation. The incoming linearly polarized light was directed onto the Al/SiOC(-H)/p-Si(100)/Al samples at a 45° incident angle and focused to 750 µm diameter spot on the sample. The SHG signal are selected by a polarization analyzer and detected in the photomultiplier tube. All SHG measurements are performed in the ambient atmosphere. The detailed results will be presented.