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Modification of Si-O-Si Structure in Porous SiOCH Low-k Films with Ions, Radicals, and VUV Radiation in O_2 Plasma[1] HIROSHI YAMAMOTO, KOHEI ASANO, KEIGO TAKEDA, KENJI ISHIKAWA, HIROKI KONDO, MAKOTO SEKINE, MASARU HORI, Nagoya University — Since the trench sidewall in porous SiOCH film is known to suffer serious damage during the plasma processes, understanding of the damage occurring mechanism is important for realizing damage free processes. In this work, the impact of ions, radicals and VUV radiation in O_2 plasma on Si-O-Si structure was investigated. To investigate the Si-O-Si bond modification in the films, IR absorption signal in 985-1250 cm^{-1} were decomposed to three bands with peaks at 1035, 1065, and 1149 cm^{-1}, which correspond to the linear, network and cage structures, respectively. The Si-O-Si linear structure changed to network and cage structure with decrease in Si-CH_3 bond after O_2 plasma exposure. VUV radiation in O_2 plasma did not cause damage on the porous SiOCH films. O radicals caused the extraction of -CH_3 groups and the modification of the Si-O-Si structure and this reaction is enhanced by VUV radiation.

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