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Evaluation of Plasma Ashing Damages on Porous SiOCH Films by Measurement of H and N Radical Densities HIROSHI YAMAMOTO, KEIGO TAKEDA, MAKOTO SEKINE, MASARU HORI, Nagoya University — The damage free plasma processes for Low dielectric constant (low-k) films are required for next generation ULSIs devices. Measurement of the radical densities which have a large impact on the damage generation in low-k film is important for clarification of plasma damage mechanism. We built up an *in situ* measuring system to evaluate the properties of low-k films and behavior of radicals. H₂/N₂ ashing plasma damages on porous SiOCH films have been investigated. The surface reactions were measured by using *in situ* Fourier transform infrared reflection absorption spectroscopy and spectroscopic ellipsometry. The H and N radical densities were measured by vacuum ultraviolet absorption spectroscopy. When the flow rate ratios of H₂/(H₂+N₂) for the plasma ashing were changed, the variation of damaged layer thickness agreed well with the H radical density in the plasma. From these result, damages on the porous SiOCH are probably determined by chemical reactions of H radicals which reduce the Si-CH₃ bonds and N radicals which have an effect of inhibition of the damages.

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