

Effect of UV Pretreatment on the Formation of Nanoporous Low-k Organosilicate Thin Films

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Fabrication of nanoporous organosilicate thin film were widely studied varying pore generating materials(porogen) and matrix materials. Main factors to select a new porogen material are degradation temperature of porogen and miscibility between a matrix material and porogen. Improvement of porogen miscibility were typically done by modification of end functional group or end group capping techniques. However it's difficult to modify degradation of porogen. In this study, we proposed a new process to lower matrix condensation temperature. Photo acid generator (PAG) facilitate matrix vitrification by generating acid after UV irradiation and then, matrix condensation occurs under 200°C. This process can widen the choice of porogen. Nanoporous ultra low-k dielectric films were fabricated using modified Gemini surfactant with low degradation temperature as a porogen. X-ray reflectivity and ellipsometric porosimetry experiment were used to measure absolute porosity and pore size. Mechanical properties are measured using depth-sensing indentation experiment. Dielectric constant were measured by MIM method.