The Effect of Post-treatment on Mechanical Properties of Ultra-low Dielectric Materials

송승현*, 김원기, 이희우
서강대학교
(tmdgusthd@naver.com*)

A significant challenge in developing low-k materials is the maintenance of adequate mechanical properties as well as low dielectric constant in case of nanoporous low dielectrics. Therefore, improving reactivity between matrix and porogen is the most promising way for high mechanical strengths. For the enhanced mechanical of the nanoporous dielectrics, both UV and ozone treatment (post-treatment) are very effective due to improves reactivity and high cross-link density of ULK. In addition, UV treatment improves stability of ULK by reducing residual OH group.
We prepared nanoporous dielectric films by using organosilicate matrix and chemically reactive porogens. The organosilicate matrix was copolymers of methyl trimethoxysilane (MTMS) and 1,2-bis(triethoxysilyl) ethane (BTESE), and the reactive porogen was trimethoxysilyl xylitol (TMSXT). After ozone (1 min at 110 ℃) and UV (10 min at 430 ℃) treatment, respectively, the elastic moduli of ULK greatly increased to 11.2 GPa and 10.8 GPa at 60 vol% porogen loading when compared with non-treated ULK (E = 9.1 GPa).