

유/무기 졸-겔 재료에 비선형광학 물질의 배향특성에 대한 액정효과
Liquid crystal effects on poling behaviour of NLO chromophore dispersed in
organically modified sol-gel materials

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Second-order nonlinear optical(NLO) materials have been extensively studied for applications in photonic devices, such as frequency doubling and electro-optical(EO) modulation, because of their large optical nonlinearity, excellent processibility, low dielectric constant, and high laser damage thresholds. The poling behaviour of NLO chromophore in organic/inorganic matrixes showed the randomization of poled NLO chromophore in the absence of poling field. The liquid crystal molecules in a droplet showed a long-range orientational order along a director. Therefore, liquid crystal effects on poling behaviour of NLO chromophore dispersed in organically modified inorganic sol-gel materials were investigated. Using sol-gel process for the development of NLO material has received increasing attention. Organically modified inorganic NLO sol-gel materials are obtained via incorporation of the organic NLO active chromophore into an alkoxy silane based inorganic network. One of the most important thing in this works was that tetraethoxysilane(TEOS) and methyltrimethoxysilane(MTMS) were used as precursor followed by hydrolysis and condensation without using any acidic catalyst during the process. The NLO chromophores in the liquid crystal nanodomains were well mixed with I/O hybrid matrix, deposited on transparent ITO-coated glasses. The poling behaviour of liquid crystal effects of NLO chromophore dispersed in I/O hybrid matrix were investigated by UV-vis spectroscopy. Size distribution and morphology of the NLO chromophores doped in the liquid crystal nanodomains dispersed in I/O hybrid matrix were investigated by SEM.