Diffusion model of monomers in a photopolymer film for holographic recording

오현진, 이효진, 김은경*, Do Duc Dung[1], 김 남[1]
연세대학교; [1]충북대학교
(eunkim@yonsei.ac.kr*)

Diffusion model of monomers in holographic recording media was investigated to determine diffraction efficiency and the effect of the binder structure on holographic recording in an organic-inorganic hybrid photopolymers. Experimental value and rise of diffraction efficiency for the photopolymer films containing different organic sol-gel precursor (TSPEG) were compared with theoretical plot of diffraction intensity growth against recording time based on the first Harmonic diffusion model, using various material parameters, including the monomer diffusion constant, D, polymerization rate, refractive index of monomer, binder, and polymer. The initial rate of polymerizations in the photopolymer films, evaluated by FT-IR method was compared to the polymerization rate obtained from the simulation. Diffusion time of the photopolymer determined from the simulation was a function of TSPEG content, proving that the side chain in the organic hybrid media affect the diffusion of monomer from the dark area of the photopolymer (non-local polymerization).