

Invited Paper

Cationic Ring-Opening Photopolymerization Methods for Volume Hologram Recording

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ABSTRACT

A new photopolymer holographic recording material based on cationic ring-opening polymerization avoids limitations of conventional holographic photopolymers resulting from the free radical chemistry typically employed. The effects of oxygen, moisture, and component characteristics on holographic recording characteristics are described. Sensitivities greater than $0.1 \text{ cm}^2/\text{mJ}$ and refractive index modulations greater than 5×10^{-3} are achievable with negligible changes in the physical dimensions (volume change as low as 0.4%) of the imaged material. Linear recording is observed for exposure fluence up to $20 \text{ mJ}/\text{cm}^2$. Good Bragg selectivity consistent with the imaged thickness is observed, and both the angular response and the diffraction efficiency are stable in these materials without the need for post-imaging fixing procedures.

Cationic Ring-Opening Polymerization, Photopolymer, Volume Hologram, Bragg Selectivity, Shrinkage

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