Invited Paper

CROP holographic storage media for optical data storage at greater than 100 bits/μm^2

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ABSTRACT

Aprilis HMD-050-G-C-400 photopolymerizable holographic recording material for card and disk media, based upon cationic ring-opening polymerization (CROP), has been further optimized for recording in an increased film thickness of 400 μm. A storage density, S_{2D}, of 150 bits/μm^2 for digital data recorded holographically as pages and a dynamic range of at least M/# = 22 have been achieved, which are substantially greater than previously reported for photopolymerizable media, while concurrently the inherent low shrinkage, high image fidelity and high sensitivity characteristics of the material have been retained. Dynamic range or cumulative grating strength, $\sum \eta_i^{0.5}$, has been determined from co-locationally recorded peristrophic and planar-angle multiplexed 262 kbit data pages that exhibit low raw bit-error-rates (BER) having an average value of 1E-3 and 5.5E-3 for ~100 and ~150 bits/μm^2, respectively. Good Bragg selectivity consistent with the imaged thickness and sinc^2 function behavior is observed for the multiplexed digital data page holograms, and both the Bragg selectivity and the diffraction efficiency are stable without the need for post-imaging fixing procedures. Sensitivity during recording of digital data page holograms is in the range of 6.75 cm/mJ diminshing to 0.5 cm/mJ for 87% of the cumulative grating strength that is attained during co-locational recording.

Photopolymer, Data Page Holograms, Storage Density, M/#, Dynamic Range, Cumulative Grating Strength, Peristrophic Multiplexing, Holographic Data Storage, Cationic Ring Opening Polymerization, Recording Sensitivity

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