흡수를 고려한 Dichromated Gelatin 홀로그램의 실시간 회절효율 분석

Analysis of Real-time Diffraction Efficiency of Dichromated Gelatin Hologram including Absorption

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Time-dependent diffraction efficiency is measured during hologram formations in a dichromated gelatin (DCG) film. It is observed that the real-time diffraction efficiency of DCG film originates from AG(absorption grating) and PG(phase grating). In order to explain the complicated hologram formation dynamics, we present a phenomenological model for photoinduced refractive index and absorption changes by assuming that each photochemical reaction center is responsible for the hologram formations. We derive a theoretical expression of diffraction efficiency by using coupled wave theory for mixed transmittance hologram.[1] We also measured the polarization dependent diffraction efficiency for various incident angles.

REFERENCES

1. H. Kogelnik, Bell Syst. Tech. J. **48**, 2909 (1969).

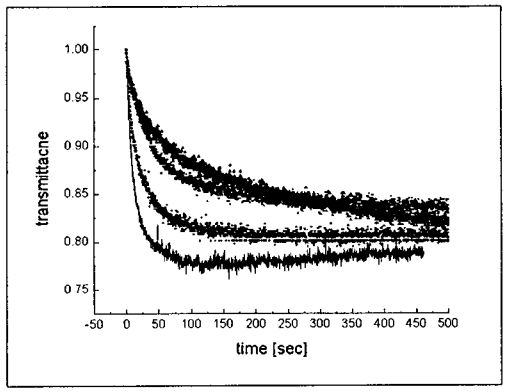

Fig. 1 Transmittance curves of DCG film for various illuminating intensities. (Transmittance curve is monitored by a weak He-Ne laser beam.)

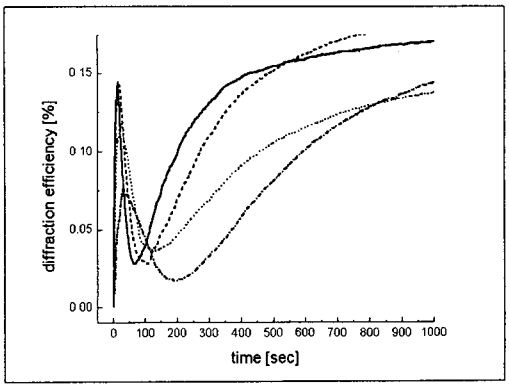

Fig. 2 Measured first-order diffraction efficiency vs. exposure time.