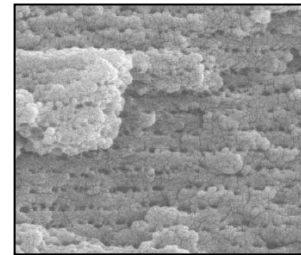
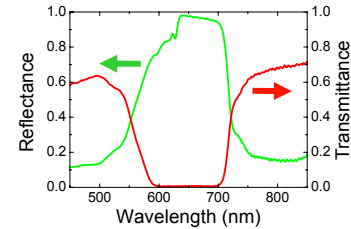


Wide bandgap photonic structures in dichromate gelatin emulsions

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We report the use of a two-beam interference to fabricate planar structures with high efficiency and wide bandgap in dichromate gelatin (DCG) holographic plates. We exploit the swelling property of DCG to fabricate layers with differential spacings by controlling the temperature or using a chemical hardening method. For the low temperature hardening, we obtain more than 95% in reflectance and less than 1% in transmittance, but narrow bandgaps. For the chemical hardening method, we obtain more than 100 nm wide bandgaps, in addition to high efficiency (top figure). The wide bandgap is due to the differential spacing of the planar structures as confirmed by cross section SEM images (bottom figure). We have also modeled the planar structure with a gradient spacing using an effective medium approach. Good agreement is obtained between theory and experiment.



[1] J. Xu, R. Ma, and W. Y. Tam, *Appl. Phys. Lett.*, 89, 081116 (2006).