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Polarization-dependent Bragg gratings formed by shearing of polymer-dispersed liquid crystals *in situ* during holographic recording TIMOTHY BUNNING, Air Force Research Laboratory, VINCENT TONDIGLIA, LALGUDI NATARAJAN, RICHARD SUTHERLAND, Science Application International Corporation, PAMELA LLOYD, UES, Inc. — We report the recording of holographic polymer-dispersed liquid crystal reflection gratings while applying a shear stress parallel to the film plane. The shear is transmitted through the film by moving one glass window with respect to a fixed glass window during the holographic recording in a single beam, total internal reflection geometry. The timing and magnitude of the stress are related to optical properties of the resulting Bragg grating. High diffraction efficiency for light polarized in a direction parallel to the stress is obtained with nearly zero diffraction efficiency for the perpendicular polarization. Contrary to post-recording stress-induced polarization sensitization, the *in situ* process results in permanently polarized gratings. The polarization sensitivity is related to stress-induced morphology changes of liquid crystal droplets that are frozen during the cure process.

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