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Molecular Alignment and Temperature Effects on Photodriven, Mulitidimensional Oscillation of Azobenzene Liquid Crystalline Polymer Networks[1] KYUNG MIN LEE, MATTHEW SMITH, HILMAR KOERNER, RICHARD VAIA, TIMOTHY BUNNING, TIMOTHY WHITE, Air Force Research Laboratory — The photodriven oscillation of uniaxially aligned monodomain azo-LCNs was investigated as a function of molecular alignment and temperature spanning a range of +/- 40 of the glass transition temperature (T_g). Monodomain azo-LCNs were synthesized between glass slide cells coated with Elvamide with an anti-parallel rubbing direction. In this work, multidimensional oscillations that include in plane bending and out of plane twisting are observed when the orientation of the axis is at intermediate angles to the long axis of the cantilever. The added dimensionality to the previously reported in plane oscillation is a result of a photoinduced shear gradient that causes twisting. The degree of twisting is shown to be dependent on both the polarization of the illuminating 442 nm light, and the orientation of the director to the cantilever geometry. Comparatively, rubbery azo-LCNs (e.g. systems heated $> T_g$) show higher amplitude than glassy azo-LCN cantilevers. The relationship between the critical laser intensity and the concentration of azobenzene monomer for the photodriven oscillation behavior of azo-LCNs will also be discussed.

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