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Azobenzene-based photomechanical monolayers as light-addressable nano-engineered structures. J.M. DAHDAH, Colorado School of Mines, T.E. FURTAK, Colorado School of Mines, Golden, CO, D.M. WALBA, G. FANG, Y. YI, J.E. MACLENNAN, N.A. CLARK, University of Colorado, Boulder, CO — Azobenzene-based photomechanical monolayers have received a great deal of attention for their potential as platforms for light-addressable nano-engineered structures in bioscience, photonics, and display technologies. We have developed an aminoazobenzene material (d-MR), derived from methyl red, which forms high-quality, covalently anchored monolayers on glass. These monolayers demonstrate unusually high sensitivity to polarized light, which controls the molecular orientation distribution through optical anisotropy of the trans-cis isomerization. In an effort to understand and optimize this phenomenon we are studying the influence of the two-dimensional molecular field on the dynamics of the light-driven reorganization. We have correlated the behavior of d-MR monolayers, as determined by spectral studies of dichroism and differential reflection ellipsometry, to dilute solutions of d-MR in a variety of solvents, as characterized by absorption cross sections, quantum yields, and characteristic time constants. The resulting information has helped to clarify the details of how these molecules respond to light leading to design strategies for even higher performing monolayers.

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