

Disequilibrating azobenzenes by visible-light sensitization under confinement

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Photoisomerization of azobenzenes from their stable *E* isomer to the metastable *Z* state is the basis of numerous applications of these molecules. However, this reaction typically requires ultraviolet light, which limits applicability. In this study, we introduce disequilibrium by sensitization under confinement (DESC), a supramolecular approach to induce the *E*-to-*Z* isomerization by using light of a desired color, including red. DESC relies on a combination of a macrocyclic host and a photosensitizer, which act together to selectively bind and sensitize *E*-azobenzenes for isomerization. The *Z* isomer lacks strong affinity for and is expelled from the host, which can then convert additional *E*-azobenzenes to the *Z* state. In this way, the host–photosensitizer complex converts photon energy into chemical energy in the form of out-of-equilibrium photostationary states, including ones that cannot be accessed through direct photoexcitation.

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