Design and synthesis of a DASA-based photoswitchable probe for lipid membrane analysis

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We present a photoswitchable molecular probe capable of reporting on the lipidic architecture of biological membranes. Built upon the Donor–Acceptor Stenhouse Adduct (DASA) platform, this probe is expected to respond dynamically to its environment, with switching kinetics sensitive to local lipid density and membrane affinity. In model membrane systems, we predict that densely packed lipid phases significantly alter the rate and efficiency of the photoisomerization process. These results suggest a mechanistic correlation between membrane structure and photochemical behavior, positioning DASAs as promising tools for studying membrane heterogeneity and dynamics *in situ*. This work bridges responsive molecular design with functional biological imaging applications.

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