

## Synthesis, Photochemistry and Photophysics of Stilbenofullerenes

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The photochemistry and photophysics of two sets of fullerostilbene isomers, in which stilbene is covalently linked to C<sub>60</sub>, will be described. Synthesis and characterization of cis- and trans-stilbenomethano- fullerenes 1 and 2, and cis- and trans-stilbeno-fulleropyrrolidines 3 and 4 are described. While UV irradiation of the stilbenoketal precursors to 1 and 2 lacking the fullerene moiety afforded a photostationary state with 90:10 cis:trans ratio, similar to that of other model stilbene systems, direct and fluorenone-sensitized irradiation of 1 and 2 led to complete conversion to the trans isomer 2, as determined by HPLC analysis. The same results were obtained using cis-trans isomers 3 and 4; namely, the photostationary state on excitation below 350 nm is essentially 100% trans. No isomerization in either system was obtained on excitation above 400 nm, where all the light is absorbed by the fullerene moiety. These results suggest that both singlet and triplet excited states of the trans- stilbene moiety in 2 and 4 are being quenched by intramolecular energy transfer to the attached C<sub>60</sub>, while the much shorter lived cis-stilbene excited states are not similarly quenched. Fluorescence studies on compound support this hypothesis, as the characteristic fluorescence emission of trans-stilbene and trans-stilbene derivatives is not observed in the case of adduct 2 or 4. Since trans-stilbene S<sub>1</sub> states are longer lived than the S<sub>1</sub> states of the corresponding cis isomers, rapid intramolecular singlet-singlet energy transfer to the appended C<sub>60</sub> moiety,  $k_{et} \sim 10^{12} \text{ s}^{-1}$ , is able to compete effectively with radiative and radiationless deactivation of the trans-stilbene but not the corresponding cis-stilbene S<sub>1</sub> states.