Foldamer Made Photoswitchable

Foldamers are molecules that reversibly switch between folded and unfolded conformations in response to changes in temperature or solvent composition. The dynamic nature of this reversible conformational change makes foldamers suitable for responsive materials in biological and nanoscience applications. Foldamers that respond to light are desirable because the stimulus is noninvasive and its location, intensity, and timing can be controlled. Toward this end, researchers from Max-Planck Institut für Kohlenforschung in Germany have developed the first example of a photoswitchable foldamer (see Figure 1).

As reported in the March 13 issue of *Angewandte Chemie International Edition* (DOI: 10.1002/anie.200503849; p. 1878), MPI researchers A. Kahn, C. Kaiser, and S. Hecht incorporated a photoisomerizable core connecting two strands of a foldamer—amphiphilic oligo(*meta*-phenylene ethynylene)—previously developed and reported in the literature. The *trans*-azobenzene core mimics a dimer repeat unit of the foldamers. Irradiation at 365 nm converts the azobenzene core conformation from *trans* to *cis*. The researchers deliberately chose foldamer chain lengths that are not long enough to individually fold into helices or with the core in a *cis* conformation but that will form a helix when connected, that is, by the core in a *trans* conformation (see Scheme I). The researchers also introduced enantiomerically pure (S)-α-methyl(ethylene glycol) side chains to bias the sense of the helix and thereby allow them to monitor the conformational transition with circular dichroism spectroscopy. While the photochemical helix-coil unfolding transition occurs in seconds, thermal reversion at room temperature takes place over several hours.

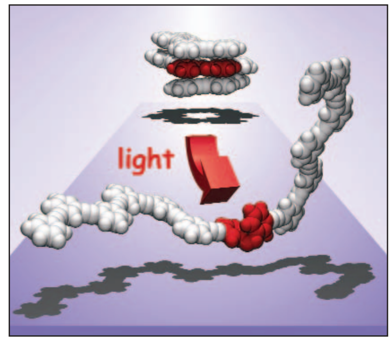
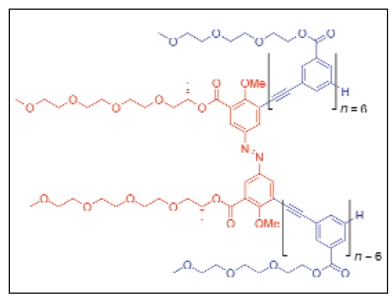


Figure 1. Irradiation of the photoisomerizable core (red) in the center of a helically folded backbone (blue) induces a reversible helix-coil transition. (Courtesy of S. Hecht and R.S. Stoll.)



Scheme I. Molecular structure of the photoswitchable foldamer includes the azobenzene core (red) and the two foldamer strands, amphiphilic oligo(meta-phenylene ethynylene) (blue).

The researchers said that the light-triggered foldamer system they developed not only "can provide fundamental insight into the folding and unfolding mechanisms by enabling time-resolved measurements but promises applications in smart delivery devices based on photoresponsive dynamic receptors."

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Layer-by-Layer Assembly Technique Used to Study Fluorescence Quenching by Gold Nanoparticles

Functionalized metal nanoparticles are of great interest for fluorescence-based sensing and biomedical diagnosis and treat-