

Supramolecular Assemblies of Diarylethenes Exhibiting Unconventional Photoresponse

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In order to apply photochromic diarylethene in practical use, especially in molecular electronics, assembly and arrangement of the molecules are very important. Therefore, supramolecular chemistry in two- and three dimensional assemblies is attracting interest.

Self-assembled microstructures of an amphiphilic diarylethene showed a photoinduced reversible morphological change in water [1-4]. Photoisomerization of the core diarylethene gave rise to a morphological transformation between colorless microspheres and colored fibers. This system showed reversible morphological change also by temperature change. These behaviors can be interpreted as a photoinduced LCST transition (Figure 1).

Two-dimensional (2D) self-assembly of photochromic molecules was studied by STM at the liquid/solid interface with single molecule resolution and cooperative model on 2D assembly was introduced by analyzing the concentration dependence of surface coverage [5-11]. The high cooperativity was found to be the origin of the experimentally observed abrupt change of surface coverage over concentration in a supernatant solution. By using high cooperative system, high sensitive photochemical control of the assembly becomes possible.

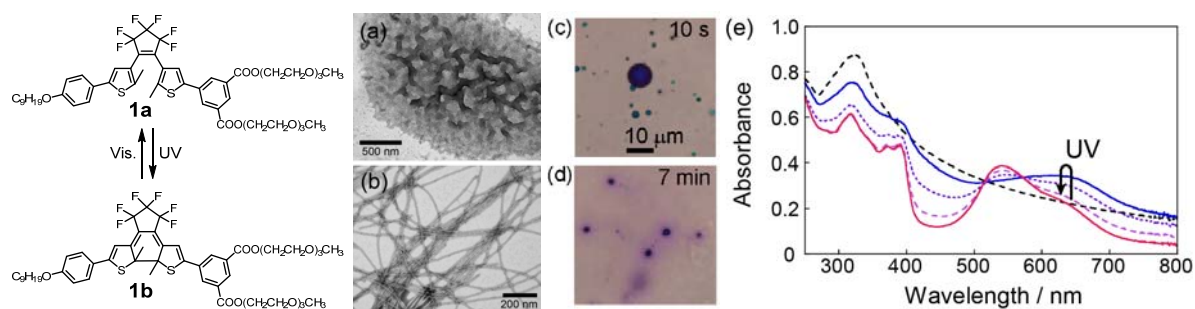


Figure 1. Sphere-fiber phase transition of diarylethene **1**: TEM image of (a) open-ring isomer **1a**, (b) closed-ring isomer **1b**; optical microscope image (c) immediately after UV irradiation and (d) after 7 min of UV irradiation; (e) absorption spectral change upon UV irradiation.

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