Reversible Photochemical Conversion of Helicity in Self-Assembled Nanofibers from a \(1,\omega\)-Thymidylic Acid-Appended Bolaamphiphile

**Materials:** \(1,\omega\)-thymidylic acid-appended bolaamphiphile 1 was synthesized by coupling \(1,20\)-icosanediol with thymidylic acid via phosphoramidite methods, as reported elsewhere.\(^{[12]}\) Oligoadenyllic acid \(\text{dA}_6\) and thymidine 3’-monophosphate (3’-TMP) were purchased from ESPEC OLIGO SERVICE Corp. and SIGMA, respectively.

**UV irradiation:** The bolaamphiphile 1 (10 mg) was dissolved in 0.5 ml of pure water (\(> 3 \, \Omega\cdot\text{cm}, c = 2.2 \times 10^{-2} \, \text{M}\)) by sonication for 1 hour. The obtained solution (0.25 ml) was dropped in a 0.1-cm quartz cell and kept to form self-assembly at room temperature overnight. The specimen was irradiated with a monochromated light (Bunkoh-keiki Co.,...
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LTD., SM-5) at λ = 280 or 240 nm for photodimerization and photodissociation, respectively.

**FE-SEM observation:** A drop of aqueous dispersions containing the self-assemblies of 1 was placed on a copper grid covered with carbon film and dried at room temperature overnight. The specimen was washed with 10 ml of pure water and dried overnight. FE-SEM observation was conducted on JEOL S-4800 (accelerate voltage 0.5 ~ 1.8 KV, working distance 4 mm).

**UV spectroscopy:** UV spectra were measured using a UV-3300 (Hitachi Ltd.) at 25 °C (cell length = 0.1 cm) for the diluted aqueous solutions of the self-assembly of 1 (2.2 x 10^{-3} M) and the binary mixture of 1 and dA₆ (2.2 x 10^{-3} / 7 x 10^{-5} M).

**¹H NMR measurement and CD spectroscopy:** The self-assembly of 1 was irradiated by UV light for 3 days and dried in vacuo overnight. The UV irradiated sample was dissolved in DMSO-d₆. ¹H NMR spectrum were recorded with tetramethylsilane (TMS) as a reference on a LA600 (600 MHz, JEOL) fourier-transform NMR spectrometer at 80 °C. CD spectra were recorded on a J-820 (Jasco Inc.) at 25 °C (cell length = 0.1 cm) for the diluted aqueous solutions of self-assembly of 1 (2.2 x 10^{-3} M) and 3’-TMP (4.3 x 10^{-3} M).
MALDI-TOF MS: The self-assembly of 1 was irradiated by UV light for 3 days and dried in vacuo overnight. The aqueous solutions of UV irradiated sample 1 (1 mg / ml) and 3-hydroxy pyridine 2-carboxlic acid (10 mg / ml) as a matrix were mixed with the ratio of 1:4. Mass spectral data was acquired using a reflectron time-of-flight mass spectrometer Kratos Kompact-MALDI III (Shimadzu) in the negative mode.

Figure S1. MALDI TOF mass spectrum of the self-assembly from 1 after 3-days UV$_{280}$ irradiation.