Supplementary Information:

Photoreversible current ON/OFF switching by photoinduced bending of gold-coated diarylethene crystals

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**Video S1.** Photoreversible current ON/OFF switching using the photoinduced bending of the gold-coated diarylethene crystals upon alternating irradiation with UV and visible light. The edge of the rod-like crystal was fixed to a gold-coated glass capillary. The movie is fast-forwarded as much as 8 times.
Experimental details

General
The photoinduced bending behavior of diarylethene crystals was observed using a Keyence VHX-500 digital microscope. UV irradiation was carried out using a Keyence UV-LED UV-400/UV-50H (365-nm light). The light intensity was 55 mW cm$^{-2}$ on the crystal surface. Visible light irradiation was carried out using a halogen lamp (100 W). The gold deposition to the crystal was performed using a VACUUM DEVICE MSP-1S sputter system. The thickness of gold was measured using an atomic force microscopy (AFM) in the tapping mode using a NanoScope IIIa SPM system (Digital Instruments-Veeco) equipped with an MMAFM-type multimode SPM unit and an Olympus cantilever OMCL-AC240TS-C2. Electric measurement was carried out using a Hokuto Denko Potentiostat/Galvanostat HA-151 and a GRAPHTEC GL900.

Determination of the Initial Speed of the Curvature Change
The edge of a rod-like crystal was fixed to a glass capillary, and a fluorescent material was painted on the glass capillary. The fluorescence of the glass capillary shows the onset time of UV irradiation. The value of the curvature against UV irradiation time ($t$) was fitted by a polynomial function. The initial speed of the curvature change was calculated by the differential of the function at $t = 0$.

Measurement of Young’s modulus
The Young’s modulus of the crystal was measured by means of a manual beam-bending test. Figure S6 shows a schematic illustration of the experimental setup. The Young’s modulus was calculated using an equation which relates the load applied, the length, the flexure, the second moment of area, and the modulus.$^{S1}$ The second moment of area was calculated from the coordinates of vertices in the cross-sectional view from tip of the crystal.
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Fig. S3. Illustration of Timoshenko’s bimetal model.

Fig. S4. Optical microscopic photographs of a gold-coated crystal of diarylethene 1a observed under reflection mode. The thickness of gold is 7 nm.
**Fig. S5.** Relationship between the deposition time and the thickness of gold determined by AFM observation.

\[ y = 0.46667x \]

**Fig. S6.** A schematic illustration of the experimental setup of measurement of Young’s modulus by the manual beam-bending test and the equation used (a), the typical photograph of the cross-sectional view from the tip of crystal (b), and the experimental results of the test (c). The Young’s modulus was estimated to be 3.0 (± 0.5) GPa.
**Fig. S7.** Change of the curvature relative to irradiation time with UV light to (0 1 0) face in different crystal thickness samples after gold deposition with the gold thickness of 7 nm: crystal thickness is 3.22 (○), 4.82 (●), 6.59 (□), 7.36 (■), 8.53 (×), 9.98 (▲), and 13.95 μm (△).

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Reference