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Supplementary Information

Azobenzene crystals swim on water surface triggered by light

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Contents:

Materials and methods

4-Methoxyazobenzene (MeOAZ) was purchased from Tokyo Chemical Industry Co., Ltd. and purified by column chromatography and subsequent recrystallization. Ethanol was purchased from Wako Pure Chemical Industries, Ltd. and used as received. We used three different type of water: ultrapure water (Milli-Q water), water purified by reverse osmosis membrane (RO water), and tap water (Tsukuba, Japan). However, there is no dependence of the quality of water on the motion. In experiments shown here, we used RO water. For the "azobenzene boat", filter paper (Advantec, analytical filter paper No.2) was used.

UV-VIS absorption spectra were measured using Shimadzu UV3100S spectrophotometer. Photoirradiation experiments were carried out at 365 nm using an LED lamp (Asahi Spectra Inc., POT-365) and at 450 nm using a Xe lamp (Asahi Spectra Inc., MAX-303) equipped with a bandpass filter and cold mirror module. Motion of crystals and boats were recorded on a video camera (Sony, Handycam HDR-CX630) equipped with appropriate optical filters to cut the excitation light. The motion of the boat was analyzed on an image analysis software (Kinovea 0.8.15).

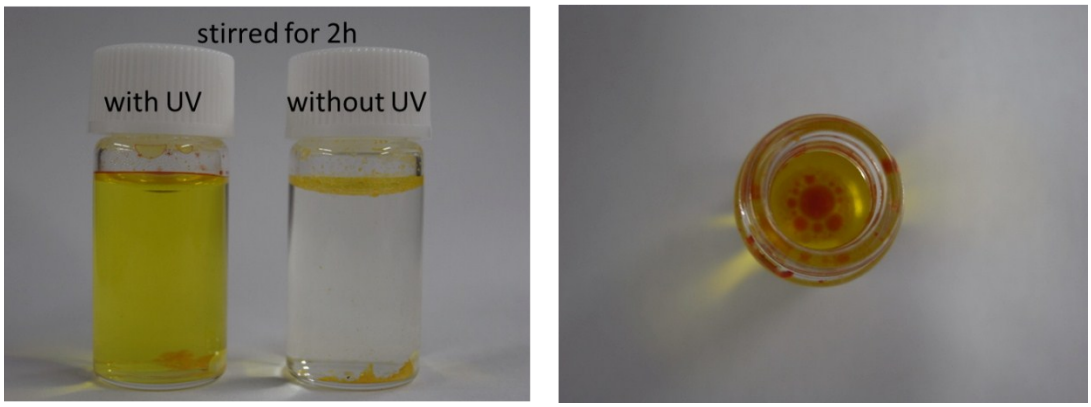

Figure S1 Left: Photographs of vials containing water and MeOAZ with and without UV irradiation. Right: Top view of the vial with UV irradiation. MeOAZ (5 mg) was suspended in 5 ml of water in each vial. Then the suspension was vigorously stirred at room temperature and UV light (365 nm) was irradiated to one vial for 2 hours at rt. The light intensity was 200 mW cm^{-2}.

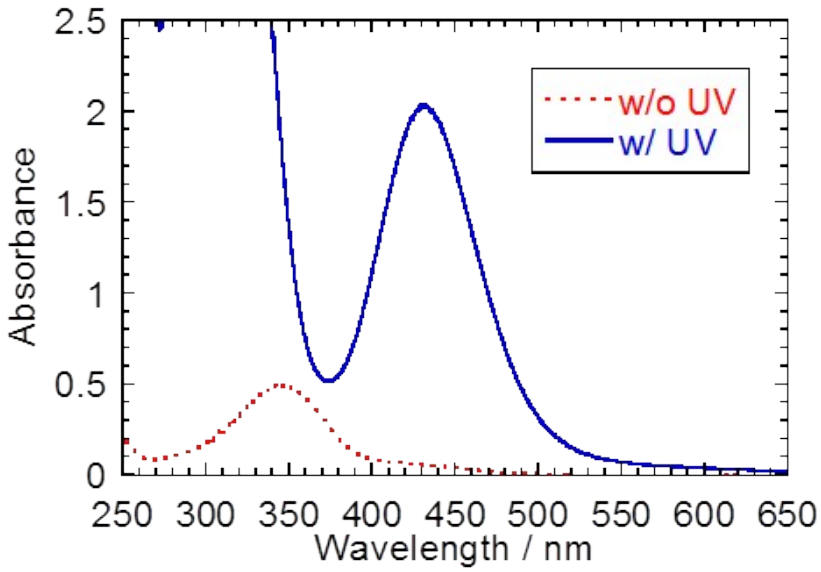

Figure S2 UV-VIS absorption spectra of the water solution shown in Figure S1. The blue line and the red dotted line are with and without UV irradiation, respectively.

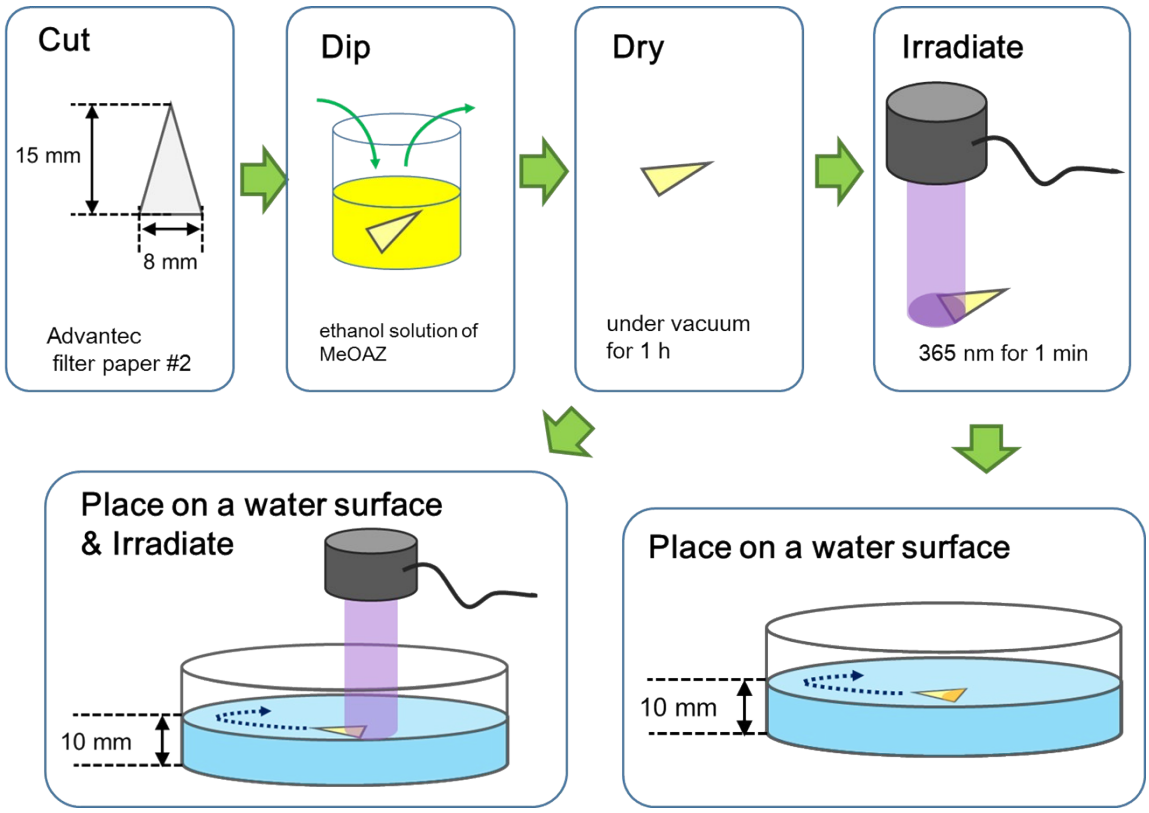

Figure S3 Procedure diagram for the preparation of the "azobenzene boat".

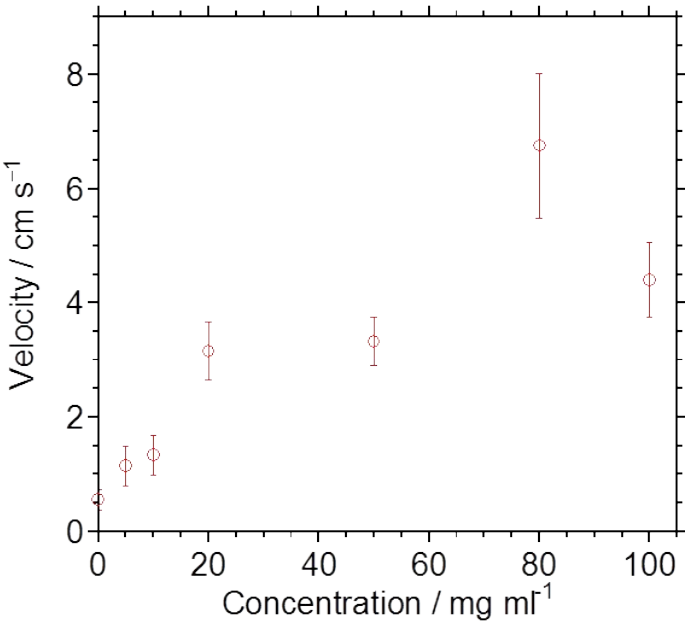

Figure S4 Plot of the velocity of the boat at different MeOAZ concentrations (ethanol solution). Velocity was determined based on the displacement in the initial 5 seconds. The irradiation was carried out for 1 min before placing on a water surface. The light intensity was 200 mW cm^{-2}. Measurements were carried out for three times.