Electronic Supplementary Material (ESI) for Dalton Transactions.

Photomechanical Effects Based on a One-dimensional Zn Coordination Polymer Driven by [4+4] Cycloaddition Reactions

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Experimental Details

Materials and general method

All chemicals purchased were reagent grade and were used without further purification. Infrared spectra in KBr (4000-400 cm^{-1}) were recorded using a Thermo Scientific Nicolet iS20 spectrometer. Thermogravimetric analysis was recorded on a Perkin–Elmer Simultaneous Thermal Analyzer (STA) 8000 in the temperature range between 25 and 500 °C under a nitrogen atmosphere at a heating rate of 10°C min^{-1}. The PXRD data were collected on a Rigaku Smart Lab SE diffractometer using Cu-Kα radiation (λ = 1.5406 Å) generated at 40 kV and 40 mA. The PXRD spectrum was recorded in a 2θ range of 5-50. UV-Vis spectra were measured on a Shimadzu UV-2700 UV-Vis spectrophotometer. ^{1}H NMR spectra were recorded on a Bruker Avance II 400 MHz NMR spectrometer. Fluorescence spectra were obtained on a HITACHI F-4700 fluorescence spectrophotometer. Photodimerization reactions were carried out using a Kessil PR-160L LED (43 W UVA lamps) at 365 nm for 5 days at room temperature under a nitrogen atmosphere. Surface morphology of 1-PVDF was measured via TESCAN MIRA LMS scanning electron microscope (SEM) and Atomic force microscopy (AFM) using Bruker Multimode 8 AFM system and the data were processed by NanoScope Analysis version 1.4 (Bruker Software, Inc.).

Synthesis of $[ZnL_2(4,4'\text{-bipy})(CH_3OH)_2]$:

A mixed solution of HL (0.05 mmol) and 4,4'-bipy (0.05 mmol) in CH_3OH (10 mL) in the presence of 0.05 mL dmpy(2,6-Lutidine) was layered on top of a H_2O solution (15 mL) of $Zn(NO_3)_2 \cdot 6H_2O$ (0.1 mmol) in a test tube. Light yellow crystals were obtained after four days at the boundary between CH_3OH and H_2O according to the literature[1].

Fabrication of the mixed matrix membrane:

The membranes were fabricated with the crystals 1 and poly(vinylidenefluoride) (PVDF, 7.5 wt %). The dry powders (75 mg) of 1 were dispersed in 5 ml acetone with bath sonication for 10 min in a penicillin bottle. PVDF solution (1.0 g, 7.5 wt %) was then added to the suspension. The mixture was sonicated for 10 min and evaporated in a vacuum to obtain a colloidal solution. The 1-PVDF film was prepared by a blade coating method and dried under vacuum at 60 °C to remove residual solvent. The membrane was then cut into approximately 10.0 mm × 1.0 mm pieces.

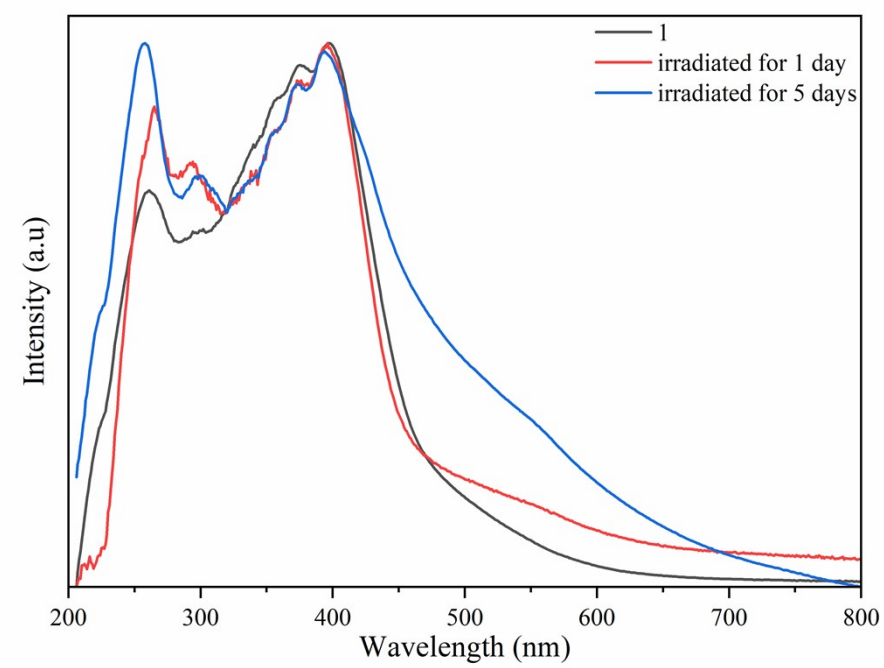

Figure S1 UV-Vis absorption spectra before and after irradiation for 1 day and 5 days.

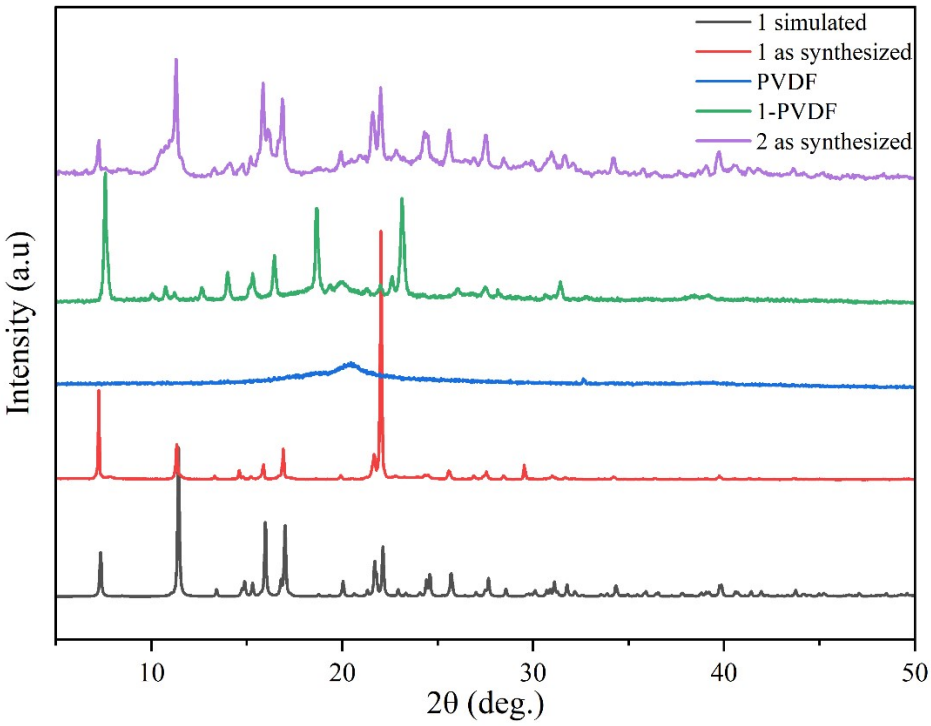

Figure S2 Powder X-ray diffraction (PXRD) patterns of simulated **1** (black), synthesized **1** (red), **1**-PVDF film (blue), pure PVDF film (green) and synthesized **2** (purple).

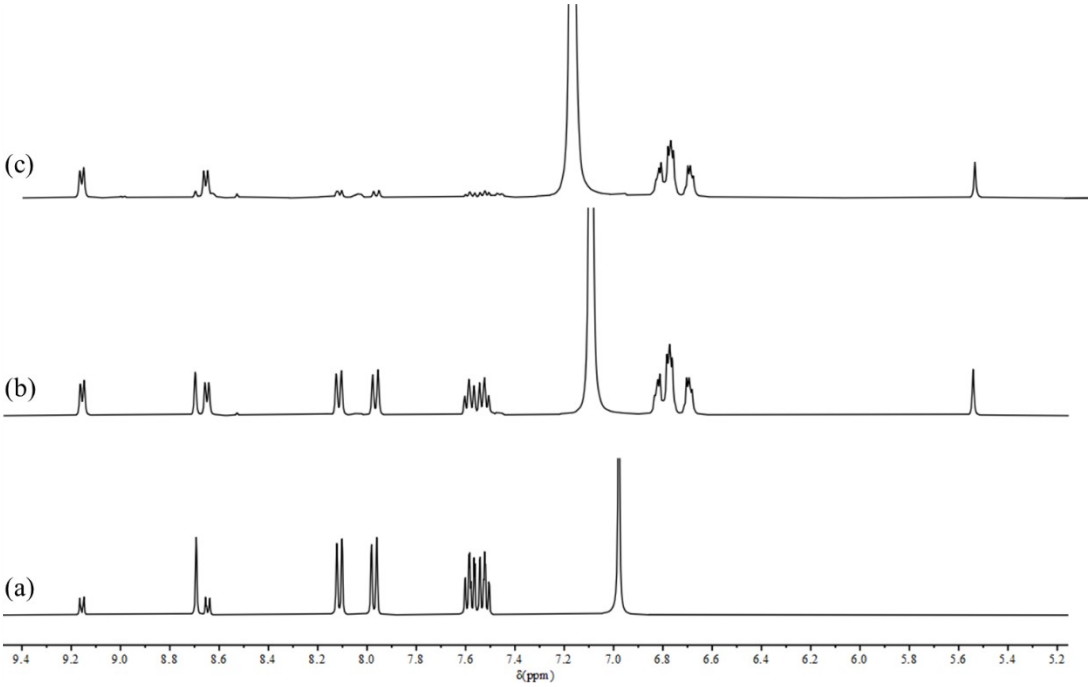

Figure S3 ^{1}H NMR of **1** (a) before irradiation, (b) after irradiation for 3 days and (c) 5 days at 365nm.

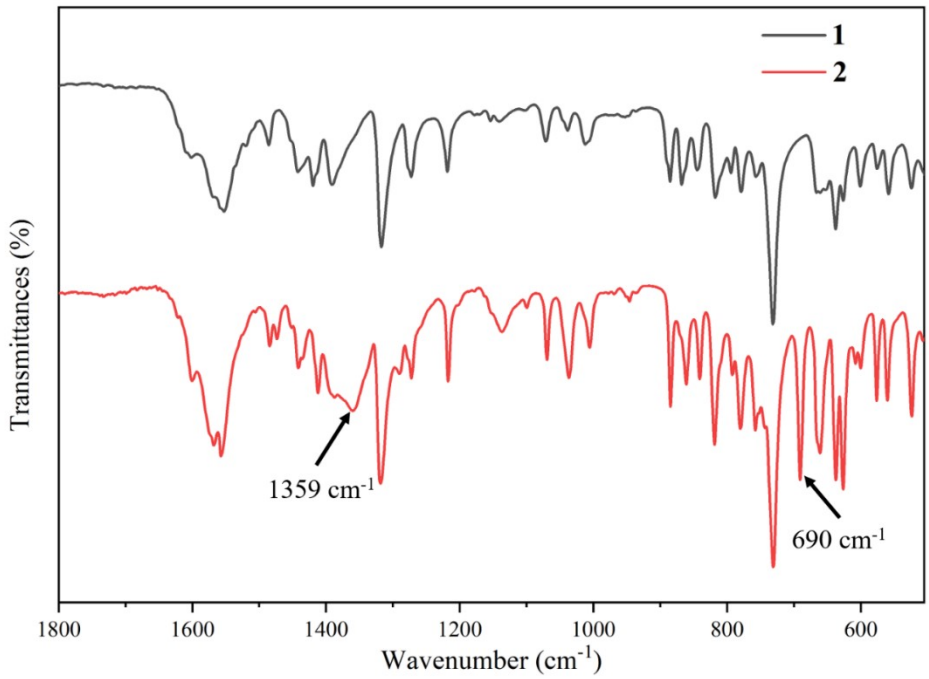

Figure S4 FT-IR spectra of **1** (black) and **2** (red).

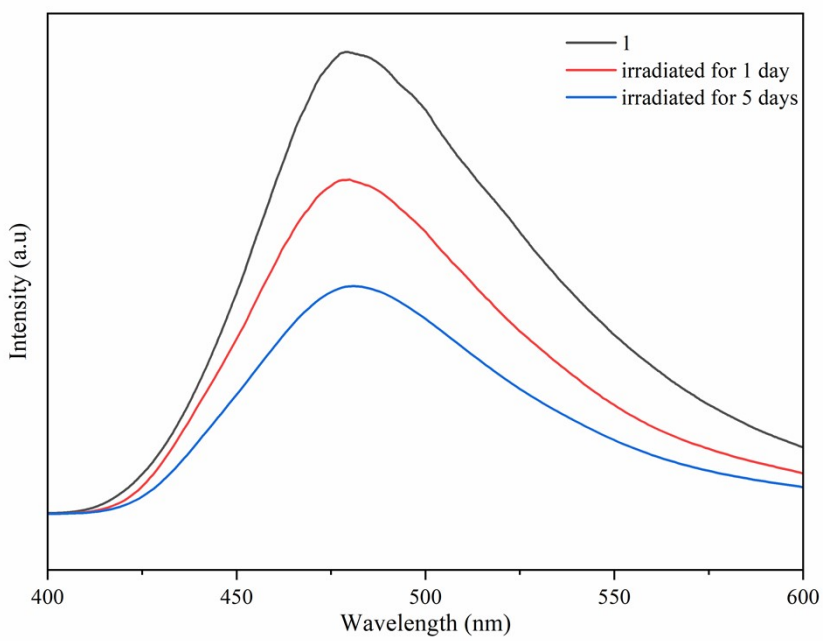

Figure S5 a) Fluorescence emission (λ_{ex} = 315 nm) spectra of **1** before and after irradiation for 1 day and 5 days.

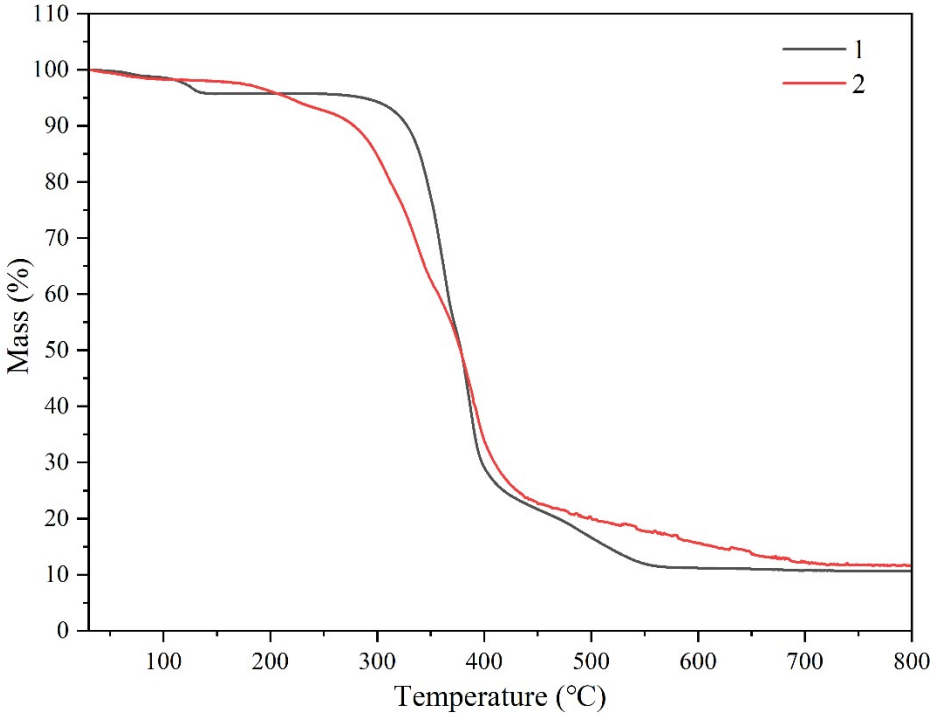

Fig. S6 TGA plot of **1** and **2** in N_2 before and after irradiation.

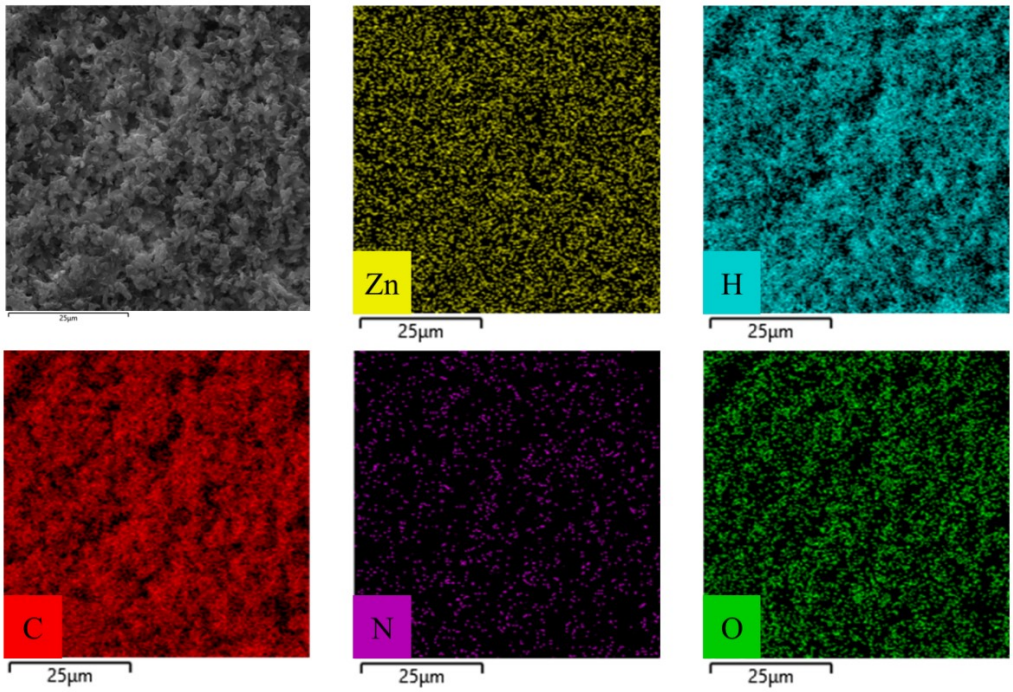

Figure S7 SEM image and EDS mapping images of the **1**-PVDF membrane.

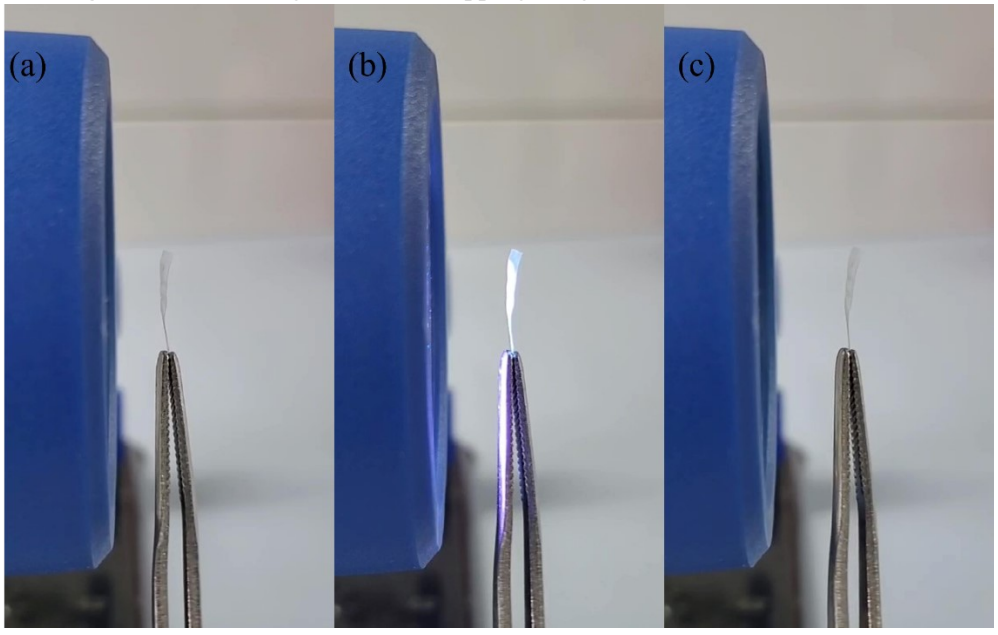

Figure S8 Optical images of Pure PVDF membrane (a) before (b) during (c) after light irradiation.

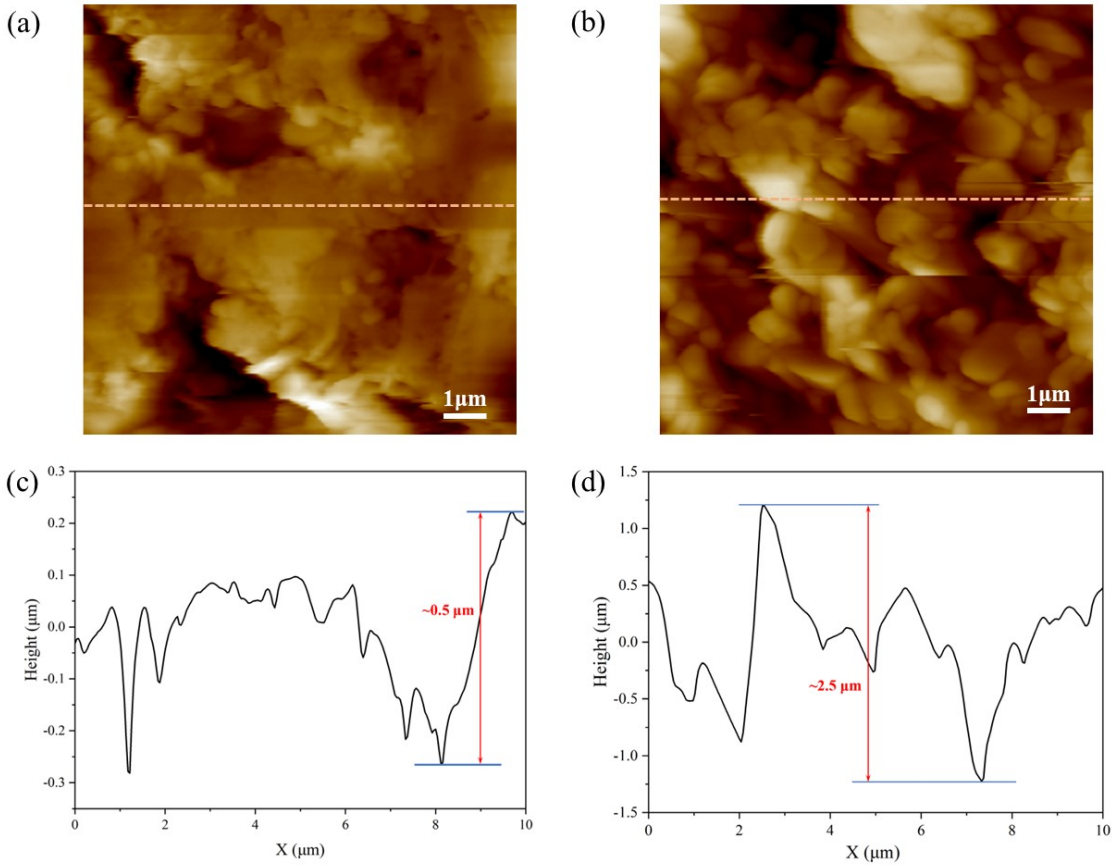

Figure S9 AFM images of surface morphologies of **1**-PVDF before (a) (c) and after irradiation (b) (d).

1. J.-J. Wang, C.-S. Liu, T.-L. Hu, Z. Chang, C.-Y. Li, L.-F. Yan, P.-Q. Chen, X.-H. Bu, Q. Wu, L.-J. Zhao, Z. Wang and X.-Z. Zhang, *CrystEngComm*, 2008, **10**, 681-692.