Supporting information

for

UV-triggered shape-controllable PP fabric

by

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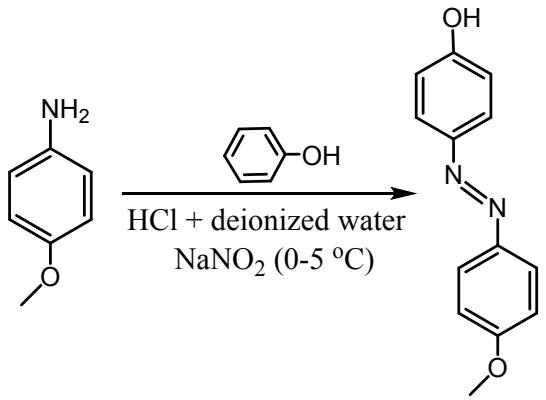
1. Synthesis of 4-(4-methoxy-phenylazo)phenol (MOPAzo)



Scheme S1. Synthesis of MOPAzo

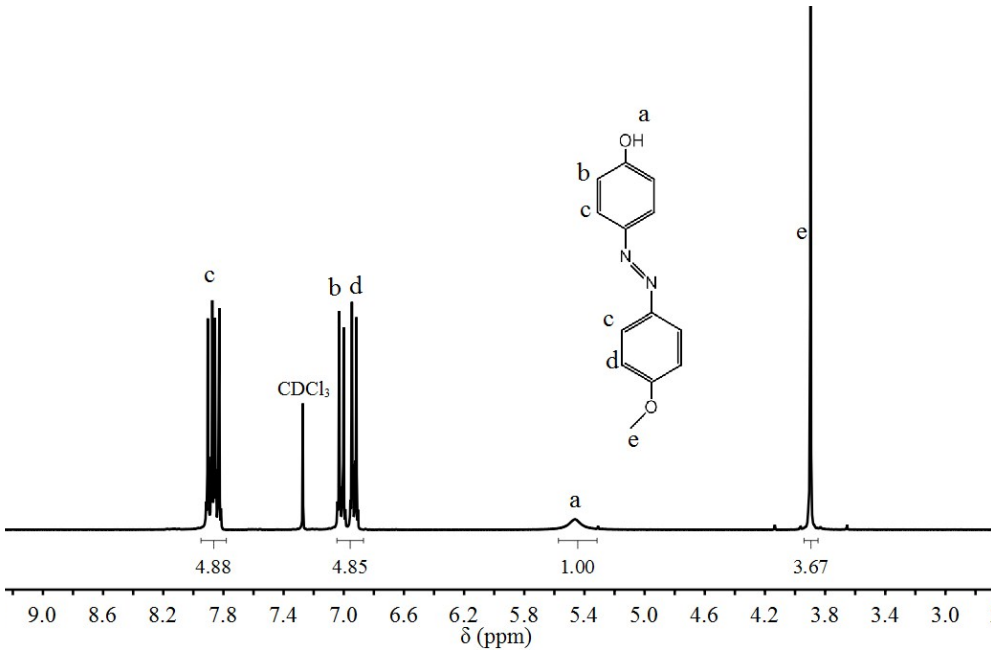


Figure S1. ^{1}H-NMR spectrum of MOPAzo

2. **Synthesis of pentafluorophenyl acrylate (PFPA)**

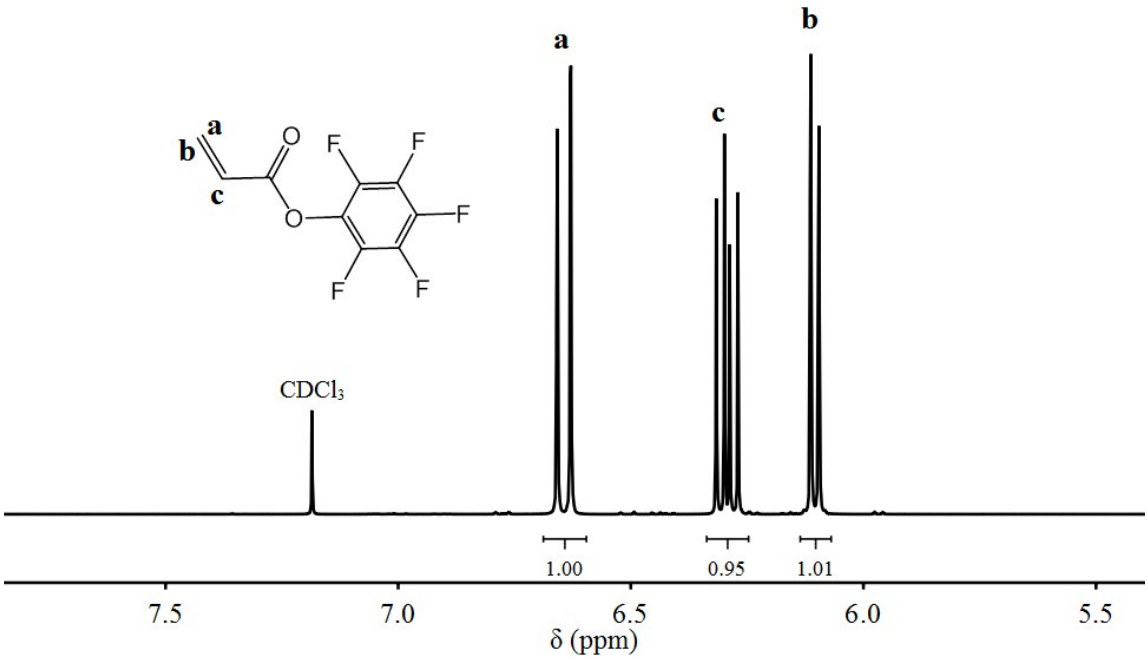


Figure S2. ^{1}H-NMR spectrum of PFPA

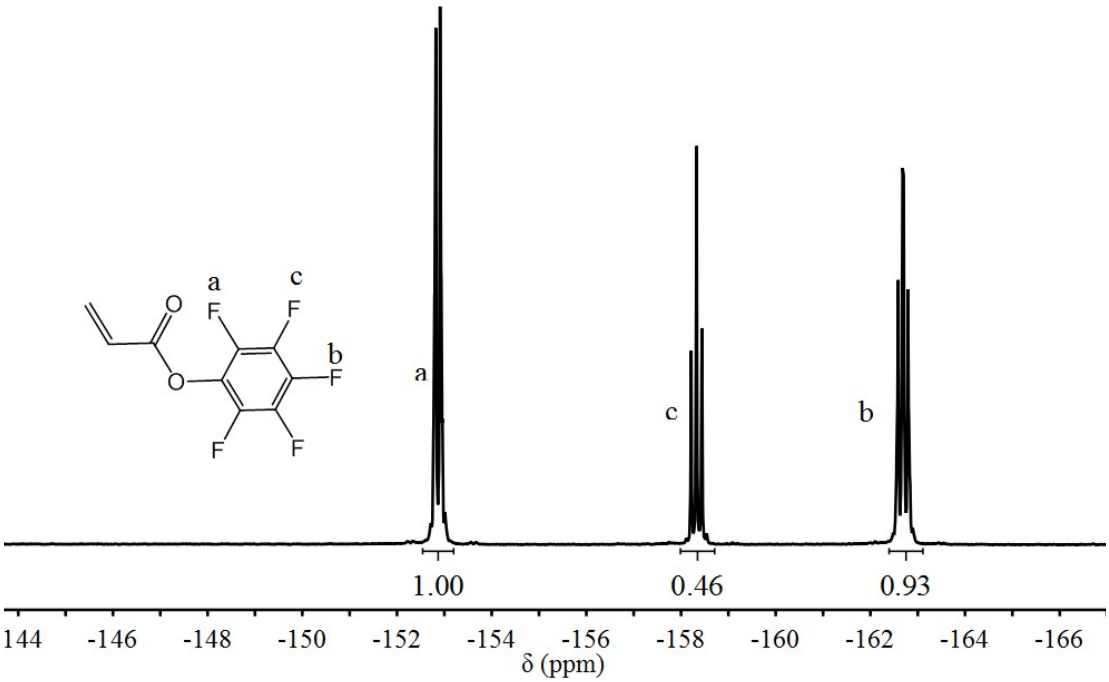


Figure S3. ^{19}F-NMR of PFPA

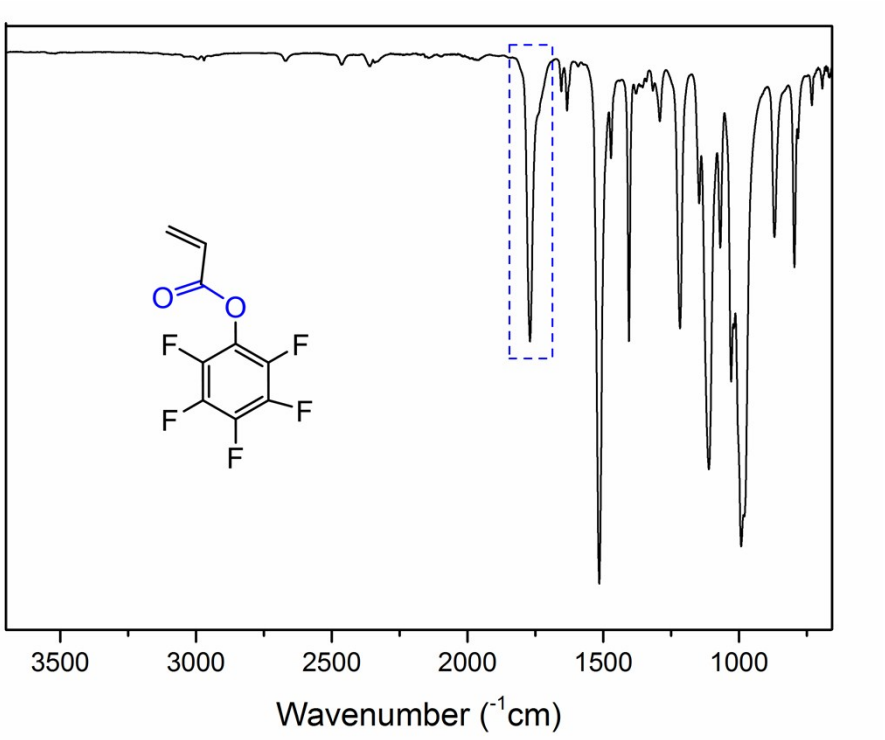


Figure S4. FT-IR spectrum of the monomer PFPA

3. Synthesis of P(DEGMA-co-PFPA) and P(DEGMA-*co*-MOPAzo)

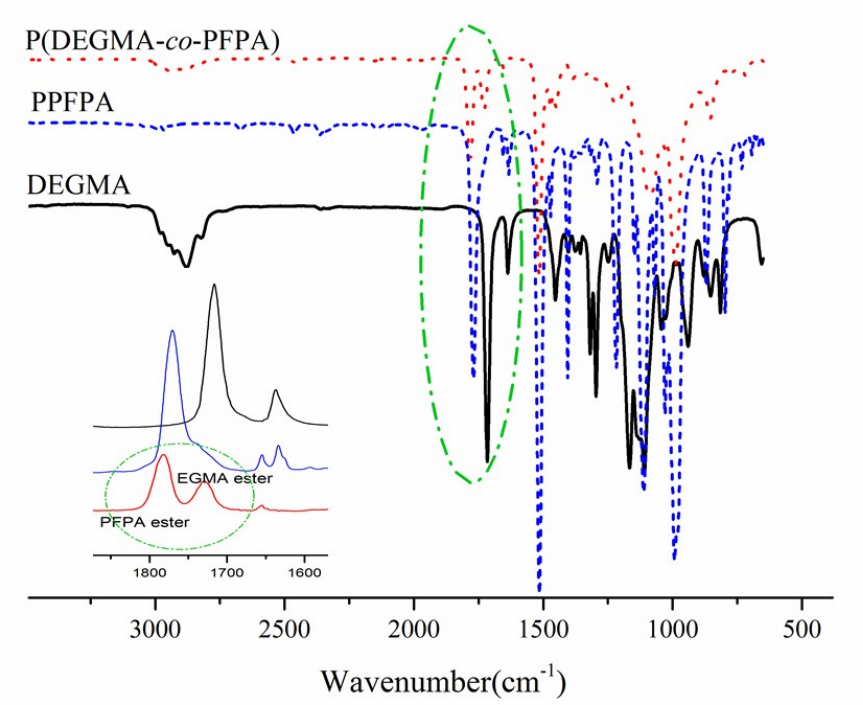


Figure S5. FT-IR spectra of P(DEGMA-*co*-PFPA) and the monomers DEGMA and PFPA

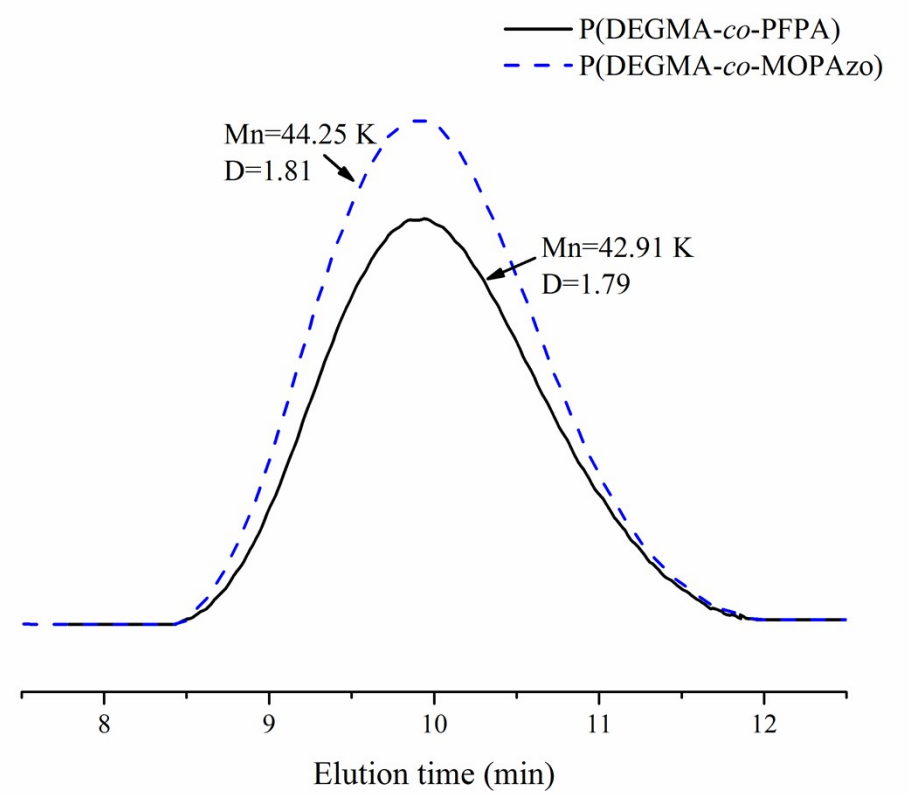


Figure S6. SEC curves of P(DEGMA-*co*-PFPA) and P(DEGMA-*co*-MOPAzo)

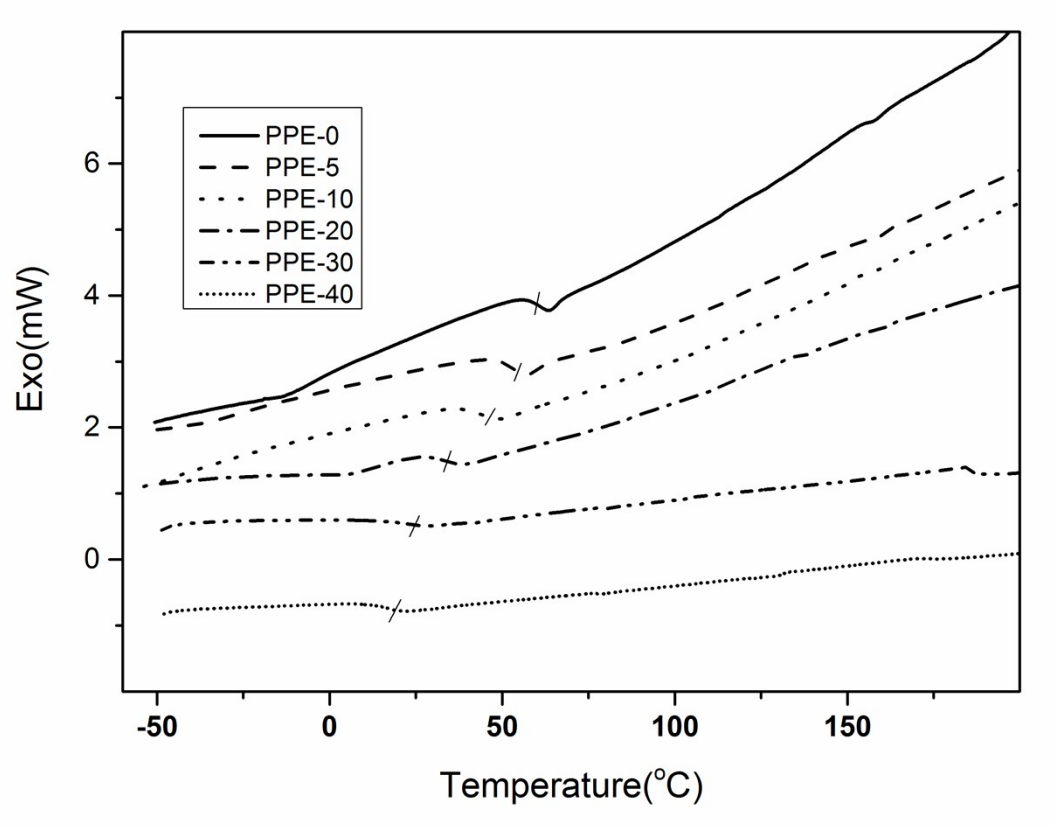


Figure S7. DSC curves of P(DEGMA-*co*-PFPA) containing varying amounts of DEGMA

Table S1. T_g values of copolymers from DSC measurement

Code	PPE-0	PPE-5	PPE-10	PPE-20	PPE-30	PPE-40
T_g (^oC)	62.83	56.94	45.15	35.23	26.32	28.61

4. Demonstration of physical adhesion of the copolymer to the PP fabric

Prior to verifying the interaction between the copolymer and the PP fabric, the solubility of P(DEGMA-*co*-MOPAzo) was measured in six organic solvents for 3 hours at room temperature. The results are presented in Table S1. Subsequently, functional PP fabrics were submerged in these solvents to demonstrate the tight adhesion (physical bonding interaction) between the copolymer and the PP fabric via calculating the mass loss of functional PP fabrics. After 3 hours, these fabrics were dried in an oven and kept at room temperature for 24 h to reach the balance of moisture. The mean of five measurements was taken for each data point. The mass loss was calculated according to the following equation:

Mass loss % = $[(W_0-W_1)/W_0]\times 100\%$

where W_0 and W_1 represent the weight of the fabric before and after the dissolution.

Table S2. Solubility behavior of P(DEGMA-*co*-MOPAzo) and functional PP fabric in different solvents

Solvents	Hexane	DEE	Water	Methanol	Acetone	THF
Copolymer	－	－	－	＋－	＋－	＋
Functional PP fabric (Mass loss %)	0	0	0	27.78%	50%	77.78%

Solubility: (－): insoluble; (＋－): partly soluble; (＋): soluble at room temperature after three hours. DEE: diethyl ether; THF: tetrahydrofuran.

In a nonpolar organic solvent and water, the copolymer and the PP fabric remain attached. Nevertheless, the part of the copolymer on top of the PP fabric dissolved partly or completely in methanol, acetone and THF, respectively.

5. Light-nonresponsiveness of the PP fabric

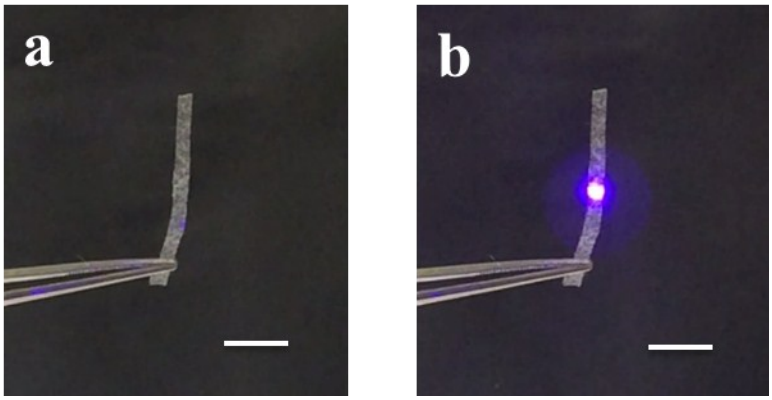


Figure S8. Photographs of PP fabric: Before (a) and after (b) UV irradiation (Scale bar=1cm).

6. Reversibility of the P(DEGMA-*co*-MOPAzo)/PP actuator in a 50° C environment

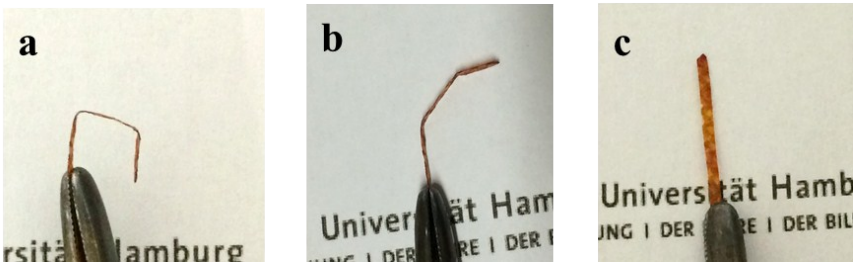


Figure S9. Photographs of the P(DEGMA-*co*-MOPAzo)/PP actuator: after exposure to UV irradiation (a); after being in a 50° C environment for 6 min (b) and 10 min (c), respectively.