

Supporting Information for:

**Acceleration of photochromism and negative
photochromism by the interactions with
mesoporous silicas**

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1. Experimental methods

Materials

1-(2-Hydroxyethyl)-3,3-dimethylindolino-6'-nitrobenzopyrylospiran (SP) was purchased from Tokyo Chemical Industry Co., Ltd. and was used without further purification.

Equipment

UV spot light (365 nm), Ushio SPL-2 with 95 mW/cm², was used for the UV irradiation. The visible light irradiation was performed by 100 W Xe lamp, ABET technologies Sunlite solar simulator. UV-vis absorption spectra were recorded on a UV-vis spectrophotometer (PerkinElmer LAMDA 1050). N₂ gas adsorption isotherm was measured on a BELLSORP-mini II (MicrotracBEL Corp.)

2. UV-vis absorption spectra

Photoinduced adsorption

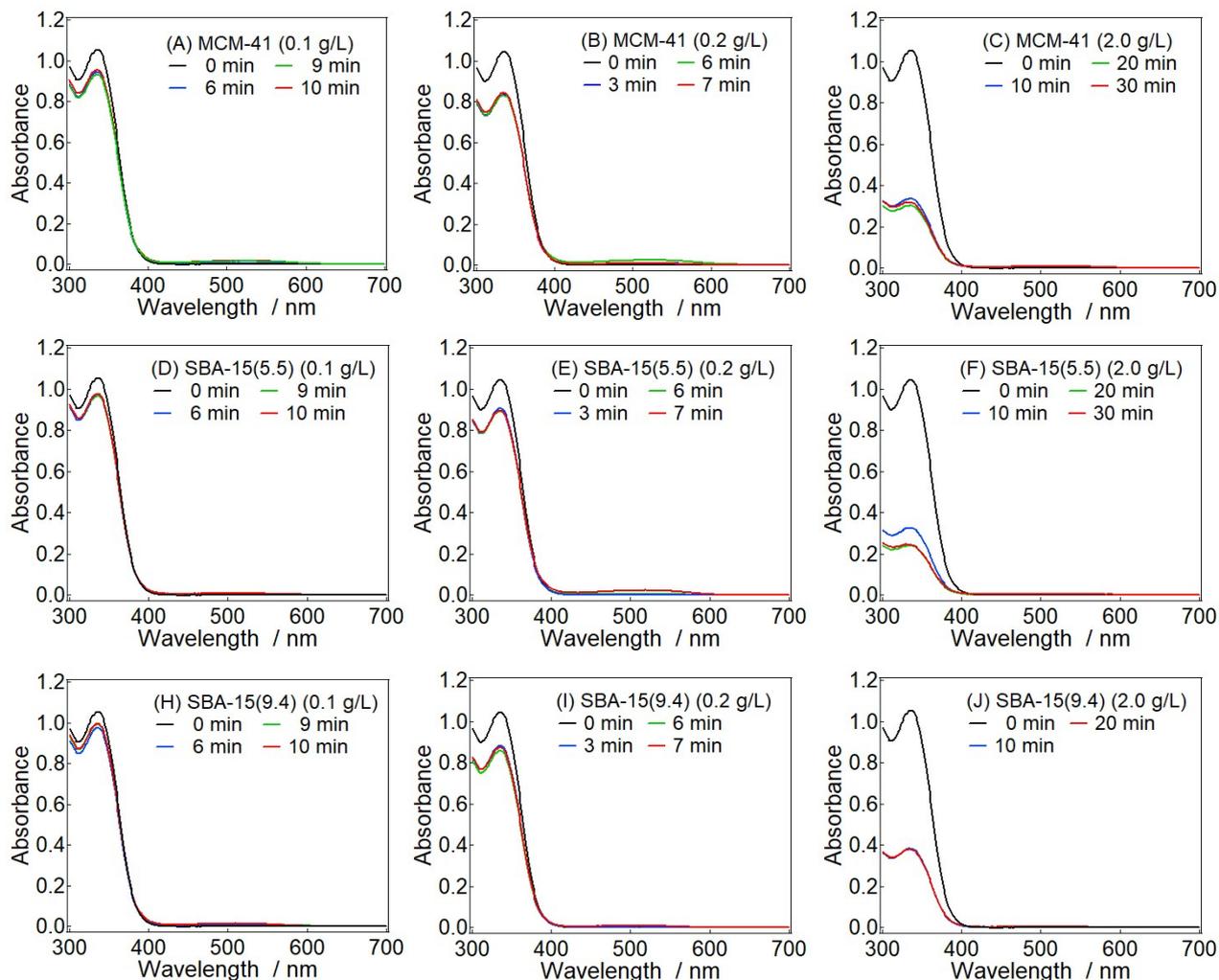


Figure S1. Changes in absorption spectra by the UV irradiation for the MPSs systems at the concentration of 0.1, 0.2 and 2.0 mg/L of solution. The spike peak at right top spectrum is due to the misoperation. The spike does not affect the absorbance at 330 nm which was used to estimate the amount of the adsorbed MC.

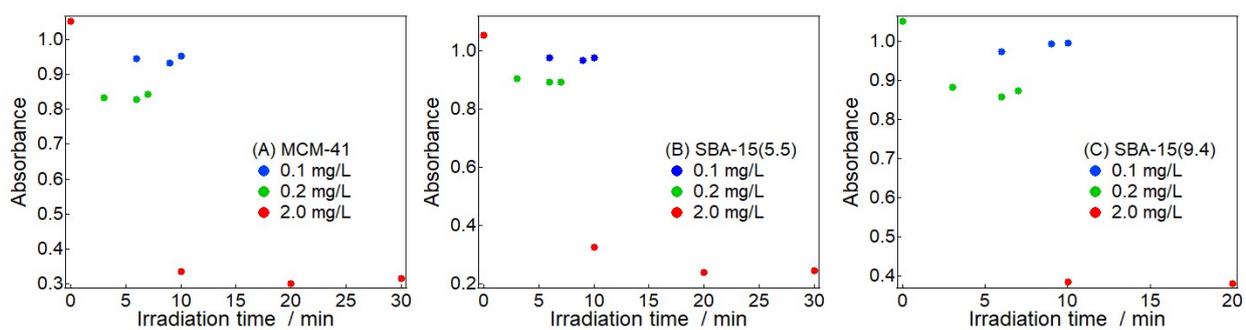


Figure S2 Changes in absorbance at 335 nm by the UV irradiation in MPSs systems at the concentration of 0.1, 0.2 and 2.0 mg/L of solution.

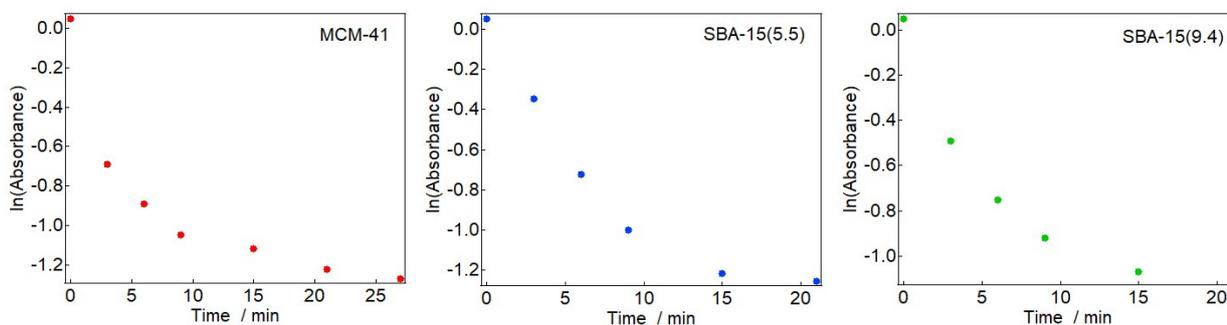


Figure S3. Log natural plots of the changes of the absorbance of SP at 335 nm shown in Figure 2D in main text.

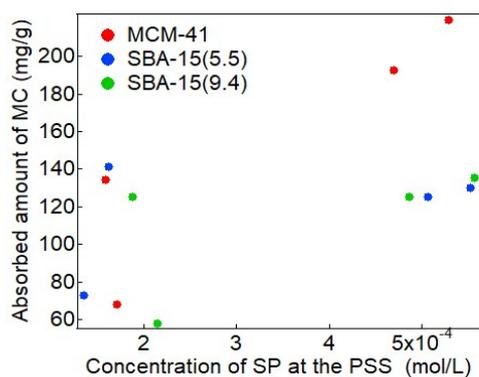


Figure S4. Adsorption isotherm of MC onto MPSs estimated from the amount of the adsorption MC and the remained SP.

3. Sample preparation for the negative photochromic hybrids

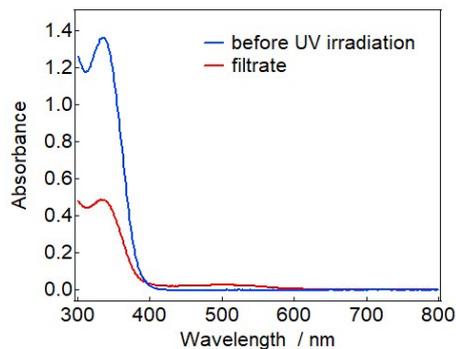


Figure S5. UV-vis absorption spectra of SP solution (6.2×10^{-4} M) contained SBA-15(5.5) (2 g/L) before UV irradiation and after centrifuge.

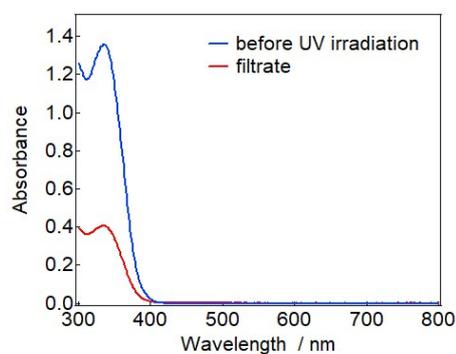


Figure S6. UV-vis absorption spectra of SP solution (6.2×10^{-4} M) contained SBA-15(9.4) (2 g/L) before UV irradiation and after centrifuge.

4. Diffuse reflectance spectra

Log natural plots of the thermal coloration of SBA-15(5.5) and SBA-15(9.4) were calculated with the equation (S1)

$$\ln \left(\frac{A_{\infty} - A_t}{A_{\infty} - A_0} \right) = -kt$$

A_{∞} , A_t and A_0 are the absorbance of MC at time of ∞ , t and 0 min and k is rate constant.

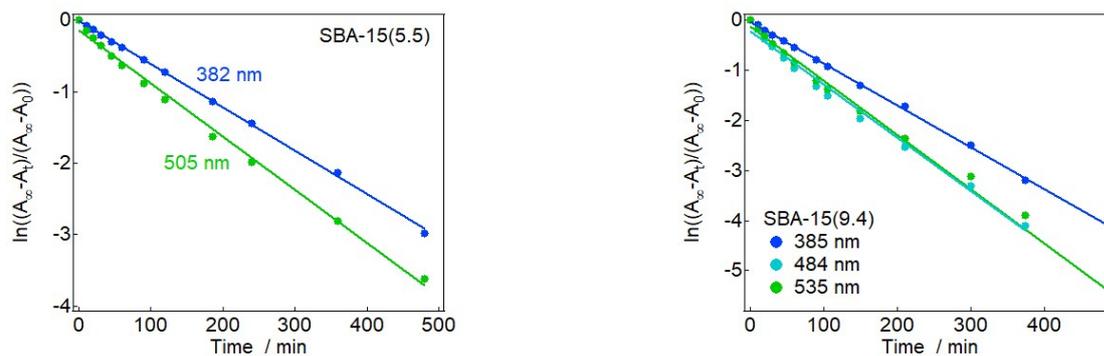


Figure S7. Log natural plots of the thermal coloration of SBA-15(5.5)/MC and SBA-15(9.4)/MC shown in Figure 3 in the main text.