Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting Information

Microwave-Assisted Crystallization Inclusion of Spiropyran Molecules in Indium Trimesate Films with Antidromic Reversible Photochromism

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BSP molecules in JUC-120 crystals:

The number (n) of BSP molecules in each pore can be estimated using the following equation:

$$n = \frac{\pi w N_A d^3}{6VM},$$

where w is the content of BSP molecules loading in porous materials, d is an average diameter of the cage, V is the pore volume of porous materials, M is the formula weight of BSP molecules and N_A is Avogadro constant.

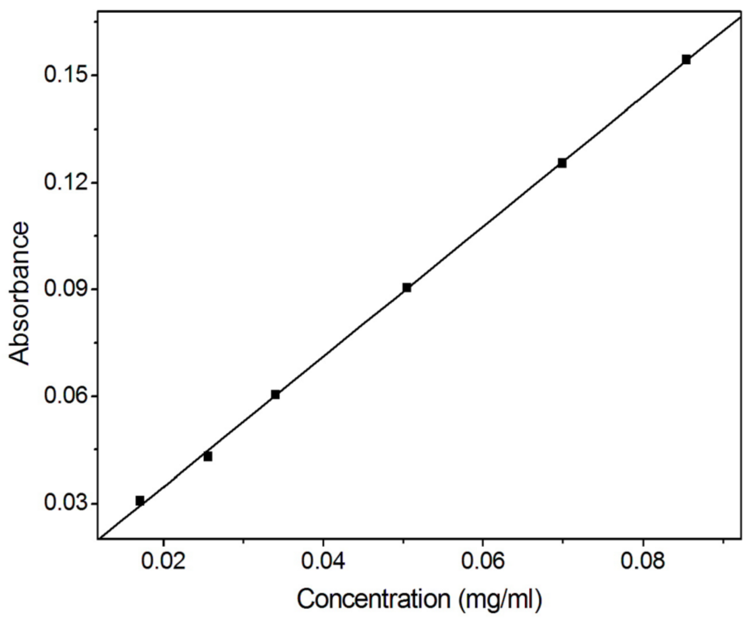

Fig. S1 Standard curve of UV absorbances of BSP solutions in function of concentrations in ethanol.

A = 1.82566 × C - 0.00185 (R^2 = 0.9996)

A is the absorbance

C is the concentration of BSP solution

R is the standard deviation

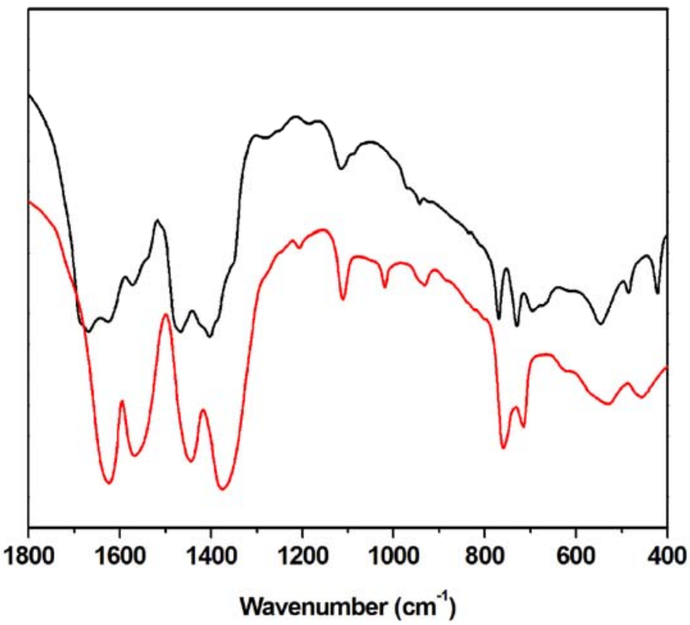

Fig. S2 IR spectra of MIL-100(Al) (black) and JUC-120 (red).

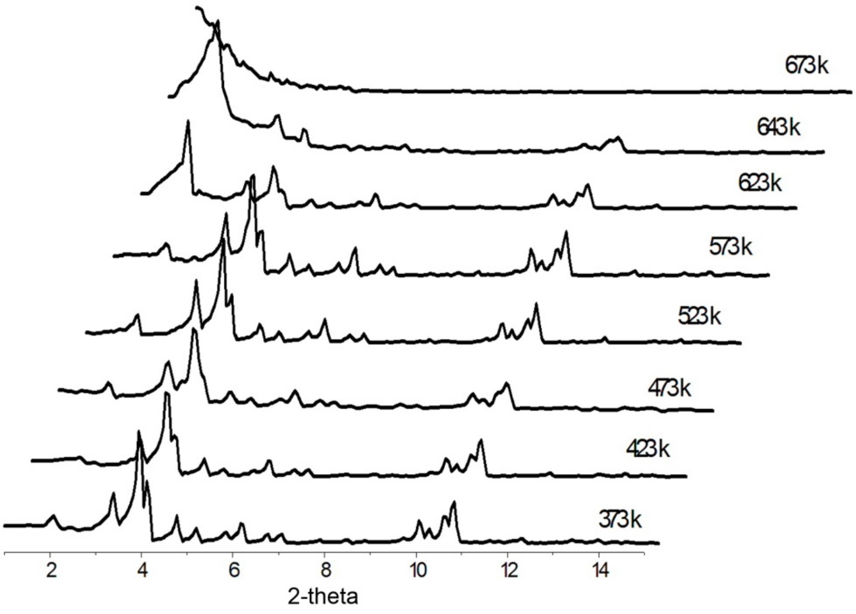

Fig. S3 XRD patterns of as-synthesized JUC-120 sample calcined at different temperatures in the air.

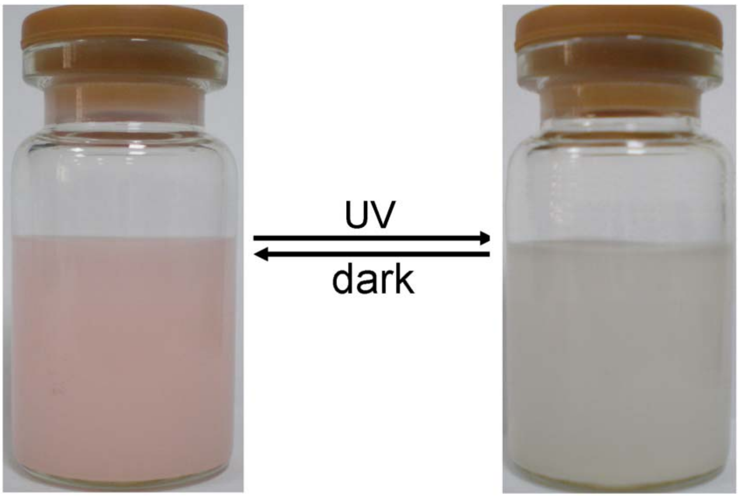

Fig. S4 Optical pictures of the BSP/JUC-120 suspension dispersed in methanol upon the UV irradiation and in the dark.

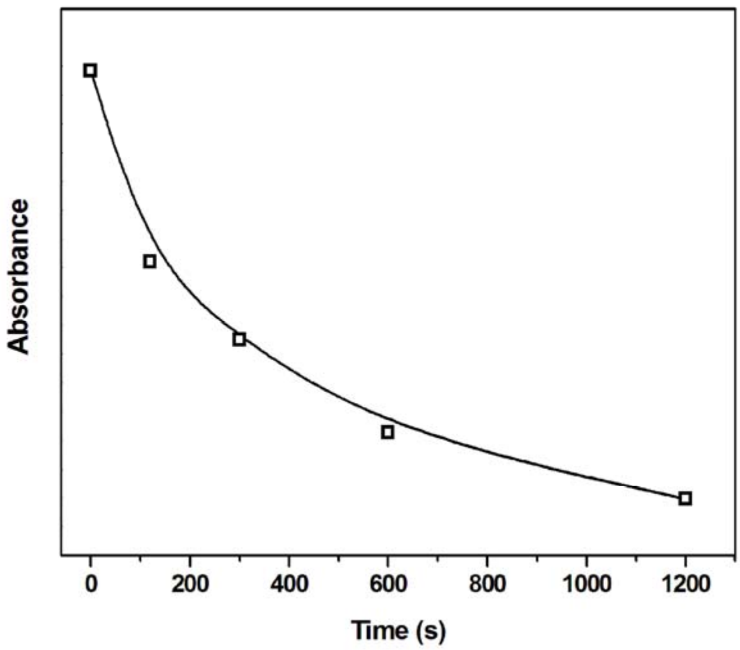

Fig. S5 The time-dependent change of the UV-Vis absorbances at 556 nm for the BSP/JUC-120 film irradiated by the external UV light.

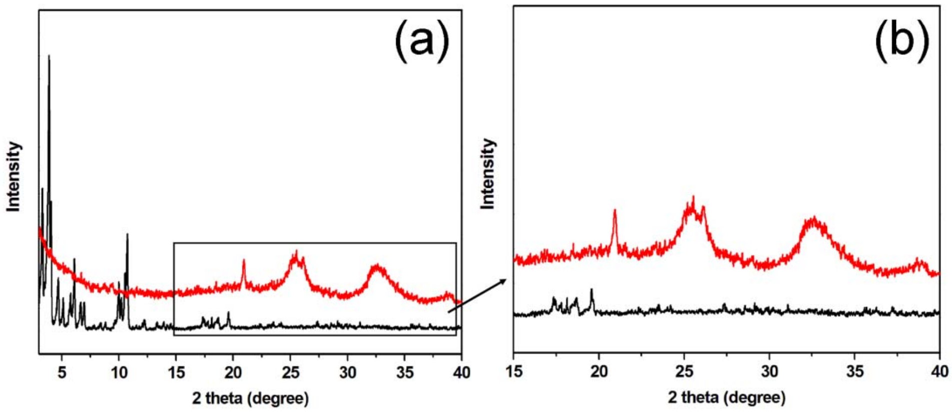

Fig. S6 The XRD patterns of BSP/JUC-120 crystals (black) and In-BSP precipitates (red) prepared under the same condition.

Table S1. The decay constants or half-lifetimes for thermal decoloration of photochromic spiropyrans and spirooxazines in different matrices.

Chromophore	Matrix	Kinetic Constant s (s^{-1}) (293 K)	Ref
spiropyrans	SBA−15	$k = 2.0 \times 10^{-4}$ s^{-1}	1
	SiO_2	$k = 6.7 \times 10^{-5}$ s^{-1} $k = 1.7 \times 10^{-5}$ s^{-1}	2
	$EtSiO_{1.5}$	$k = 1.7 \times 10^{-4}$ s^{-1}	3
	SiO_2−Me_2SiO	$k = 6.7 \times 10^{-5}$ s^{-1} $k = 5 \times 10^{-5}$ s^{-1}	3
	MeHSiO–$HSiO_{1.5}$	$k = 5 \times 10^{-3}$ s^{-1}	4
	Polymethylmethacrylate (PMMA)	$k_1 = 7 \times 10^{-4}$ s^{-1} $k_2 = 10^{-4}$ s^{-1}	5
	ethanol	$k = 3.7 \times 10^{-4}$ s^{-1}	6
	SiO_2	$t_{0.5} = 2.3 \times 10^5$ s	7
	β−cyclodextrin	$k_1 = 1.4 \times 10^{-4}$ s^{-1} $k_2 = 4.6\times10^{-5}$ s^{-1}	11
	Polymethylmethacrylate (PMMA)	$k_1 = 5.3\times10^{-5}$ s^{-1} $k_2 = 2.0\times10^{-5}$ s^{-1}	11
	PMAA−cyclodextrin	$k_1 = 9.7\times10^{-5}$ s^{-1} $k_2 = 4.1\times10^{-5}$ s^{-1}	11
	silica	$t_{0.5} = 8\times10^7$ s	12
	Poly(vinyl acetate) (PVA)	$t_{0.5} = 90$ s	13
	Si−MCM−41	$t_{0.5} = 108 - 162$ s	13
	HY	$t_{0.5} = 2.3 \times 10^3$ s	13
	DAY	$t_{0.5} = 2.6 \times 10^4$ s	13
	Phenyltriethoxy silane	$k_1 = 9.1\times10^{-3}$ s^{-1} $k_2 = 1.7\times10^{-3}$ s^{-1}	14
	vinyltriethoxy silane	$k_1 = 8.8\times10^{-3}$ s^{-1} $k_2 = 1.3\times10^{-3}$ s^{-1}	14
	methyltriethoxy silane	$k_1 = 8.4\times10^{-3}$ s^{-1} $k_2 = 1.1\times10^{-3}$ s^{-1}	14
	mesostructured silica	$k = 1.3\times10^{-4}$ s^{-1}	18
	poly(vinyl alcohol) (PVA)	$k = 3.2 \times 10−6$ s^{-1}	19
	silica	$k = 8.7\times10^{-9}$ s^{-1}	19
	Polymethylmethacrylate (PMMA)	$k = 6 \times 10^{-4}$ s^{-1}	20
	polystyrene (PS)	$k = 1.6\times10^{-3}$ s^{-1}	20
	polyethylmethacrylate−polymethylmethacrylate	$k = 1.0\times10^{-3}$ s^{-1}	20
	Poly−*i*−butylmethacrylate−poly−*n*−buty methacrylate	$k = 2.3\times10^{-3}$ s^{-1}	20
	poly−*n*−buty methacrylate	$k = 7.7\times10^{-3}$ s^{-1}	20
	silica	$k < 2.7\times10^{-7}$ s^{-1}	21
	MCM−41 (−SiC_3H_6SH)	$k_1 = 6.3 \times 10^{-4}$ s^{-1} $k_2 = 7.81 \times 10^{-3}$ s^{-1}	22
	MCM−41 (−$SiMe_3$)	$k_1 = 6.8 \times 10^{-4}$ s^{-1} $k_2 = 8.31 \times 10^{-3}$ s^{-1}	22
	SBA−15	$k_1 = 1.46 \times 10^{-3}$ s^{-1} $k_2 = 1.89 \times 10^{-2}$ s^{-1}	22

spirooxazines	SBA−15	$k = 0.15\ s^{-1}$	1
	ethanol	$k = 0.2\ s^{-1}$	1
	$MeSiO_{1.5}$	$k_1 = 1.2 \times 10^{-2}\ s^{-1}$ $k_2 = 1.4 \times 10^{-3}\ s^{-1}$	8
	$RSiO_{1.5}$–$EtSiO_{1.5}$–$EtSiO_{1.5}$	$t_{0.5} = 2$ s	9
	$MeSiO_{1.5}$–$RSiO_{1.5}$–$R'SiO_{1.5}$–SiO_2–Me_2SiO	$t_{0.5} = 2$ s	10
	Me_2SiO–ZrO_2	$k_1 = 3.1\times10^{-2}\ s^{-1}$ $k_2 = 2 \times 10^{-3}\ s^{-1}$	4
	$MeHSiO$–$HSiO_{1.5}$	$k = 0.2\ s^{-1}$	4
	PMMA	$k_1 = 4 \times 10^{-2}\ s^{-1}$ $k_2 = 4 \times 10^{-3}\ s^{-1}$	5
	SiO_2	$k = 1.6 \times 10^{-3}\ s^{-1}$	7
	$MeSiO_{1.5}$	$k = 1.2 \times 10^{-2}\ s^{-1}$	7
	copolymer of vinyl and nitrocellulose	$k_1 = 2.9 \times10^{-3}\ s^{-1}$ $k_2 = 2.2\times10^{-3}\ s^{-1}$	15
	polyurethane	$k_1 = 2.2\times 10^{-3}\ s^{-1}$ $k_2 = 5.5\times 10^{-4}\ s^{-1}$	15
	Vinyl copolymer	$k_1 = 6.3\times10^{-3}\ s^{-1}$ $k_2 = 2.2\times10^{-3}\ s^{-1}$	15
	Polyvinylalcohol	$k = 6.7\times10^{-3}\ s^{-1}$	16
	γ−Cyclodextrin	$k_1 = 6.0 \times10^{-2}\ s^{-1}$ $k_2 = 7.5\times10^{-3}\ s^{-1}$	16
	Mesostructured film Pluronic 10400 $(EO)_{27}PO_{61}EO_{27}$	$k = 0.145\ s^{-1}$	17
	Mesoporous film HMD S−grafted 40% Me $SiO_{1.5}$	$k = 0.09\ s^{-1}$	17
	Soft organo silica 50MeH SiO–50 Me $SiO_{1.5}$	$k = 1.4\times10^{-3}\ s^{-1}$	17
	mesostructured silica	$k = 0.094\ s^{-1}$	18

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