Supporting Information

Photo-change in Pore Diameters of Azobenzene-Planted Mesoporous Silica Materials

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General Procedure

$^{1}$H NMR (300 MHz) and $^{13}$C NMR (75 MHz) spectra were measured with a JEOL Lambda 300 spectrometer. Elemental analyses were performed in our laboratory of Tokyo Institute of Technology. The powder X-ray diffraction data were collected with a Rigaku RINT Ultima$^7$/PC diffractometer with monochromated Cu$K_a$ radiation ($\lambda = 0.15418$ nm, 40 kV, 40 mA, scan speed 0.24 deg min$^{-1}$). The thermogravimetric analysis was carried out by a MacScience TG-DTA 2000S in air at a heating rate of 5 K min$^{-1}$. The fluorescence spectra were recorded on a Perkin Elmer LS 55 fluorescence spectrometer.

Preparation of triethoxy[4-phenylazo(phenyl)]silane (AzTES)

Into a THF solution (83 mL) of 4-litioazobenzene synthesized from 4-iodoazobenzene (4.02 g, 13.0 mmol) and $n$-butyllithium (1.58 M in $n$-hexane, 8.7 mL, 13.7 mmol) at 168 K, chlorotriethoxysilane (2.8 mL, 18 mmol) was added dropwise. The mixture was stirred under argon at 168 K for 15 minutes and then at room temperature overnight, evaporated, and extracted with CH$_2$Cl$_2$. The crude products were separated by a chromatograph (CH$_2$Cl$_2$, Merck Silica Gel 60). The eluted main component was purified by distillation with a glass tube oven (1 mmHg, 503 K) to give AzTES (1.87 g, 42%) as red oil: UV-VIS (n-heptane) $\lambda_{max}$ (log $\epsilon$), 321 (4.37), 445 (2.79); IR (KBr) $\nu$ (Si-O) 1079, 1102 cm$^{-1}$; $^1$H NMR (CDCl$_3$, 30 MHz, TMS) $\delta$ 7.82-7.95 (m, 6H, Ar), 7.44-7.59 (m, 3H, Ar), 3.90 (q, 6H, CH$_2$), 1.27 (t, 9H, CH$_3$); $^{13}$C NMR (CDCl$_3$, 75.45 MHz, TMS) $\delta$ 153.81, 152.66, 135.68, 134.46, 131.15, 129.07, 122.91, and 121.97 (Ar), 58.34 (CH$_2$), 18.21 (CH$_3$); Found: C, 62.86; H, 6.67; N, 8.06%. Calcd for C$_{18}$H$_{24}$N$_2$O$_3$Si: C, 62.76; H, 7.02; N, 8.13%.
Figure S1. Changes in DR UV-VIS spectra of Az-M41-22 (a) and -16 (b) upon UV irradiation.