Supporting Information

Photon-manipulated Mesoporous Nanocontainer for Reversible Release Controlled by Azobenzene-modified Nucleic Acid

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Chemicals.

Tetraethylorthosilicate (TEOS), sodium hydroxide, cetyltrimethylammonium bromide (CTAB), 3-isocyanatopropyltriethoxysilane and rhodamine 6G were purchased from Sigma-Aldrich. Phosphate buffered saline (PBS) and tris(hydroxymethyl)aminomethane (Tris) were purchased from Fisher Scientific.

Cell lines.

Human acute lymphoblastic leukemic CCRF-CEM cell line was provided by Prof. K. M. Wang in Hunan University. Human lung adenocarcinoma A549 cell line was provided by Prof. X. H. Fang in Institute of Chemistry, Chinese Academy of Science.

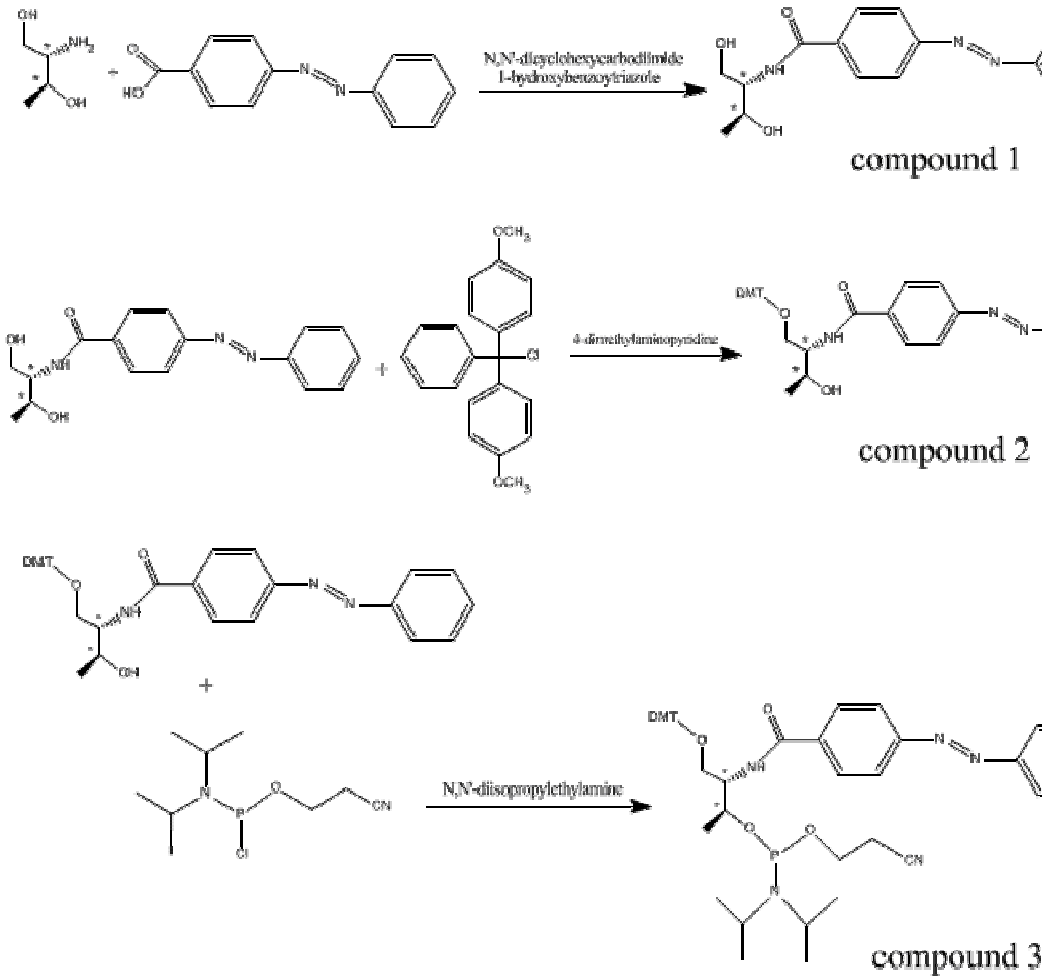
Instruments.

Fluorescence measurements were carried out on a FluoroLog-3 spectrofluorometer (Jobin Yvon). The concentrations of all DNAs were determined using the absorbance of DNA at 260 nm, as measured on a Cary Bio-300UV spectrometer (Varian), by calculating the absorbance of DNA at 260 nm. XRD patterns were recorded on a D/MAX-2000 diffractometer (Rigaku), using Cu-Kα radiation (λ = 1.5406 Å). Scanning electron microscopy (SEM) images were taken from a JEOL JSM-6700 scanning electron microscope. Transmission electron microscopy (TEM) images were obtained on an H-7000 NAR transmission electron microscope (Hitachi) with a working voltage of 100 kV. The nitrogen adsorption and desorption isotherms at 78.3 K were measured using an ASAP 2010 analyzer (Micromeritics). The BET model was applied to evaluate the specific surface areas. Pore size and pore volume were determined from the adsorption data by the BJH method. Confocal images were taken on Olympus FV500-IX81 confocal microscope.

Light sources

A portable 6 W UV light source was chosen to convert the *cis*- to *trans*- transition. As the visible light source, a 60 W table lamp with a 450 nm filter was selected to trigger fast *cis*- to *trans*- conversion. For all the experiments, the light sources were carefully positioned so that direct heating to induce a sample temperature increase was prevented.

Synthesis of azobenzene phosphoramidite



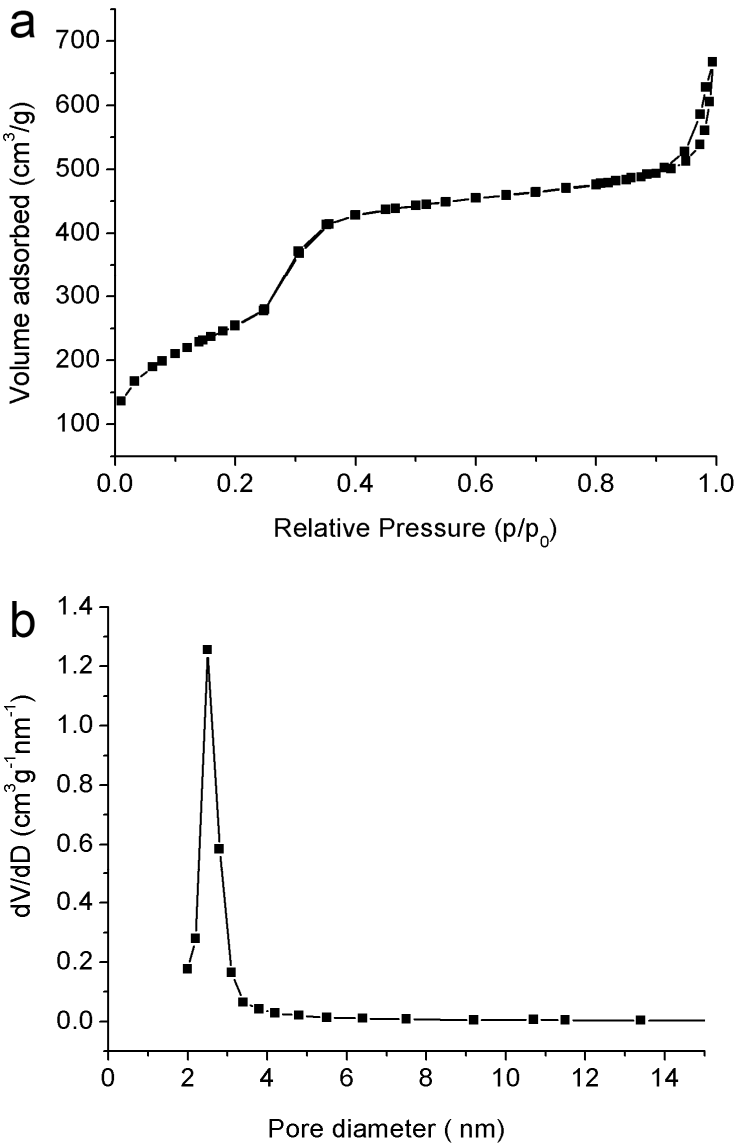


Figure S1. (a) BET nitrogen adsorption/desorption isotherms and (b) BJH pore size distributions of DNA-functionalized MSN.

Figure S2. Set-up for Rh6G release test.

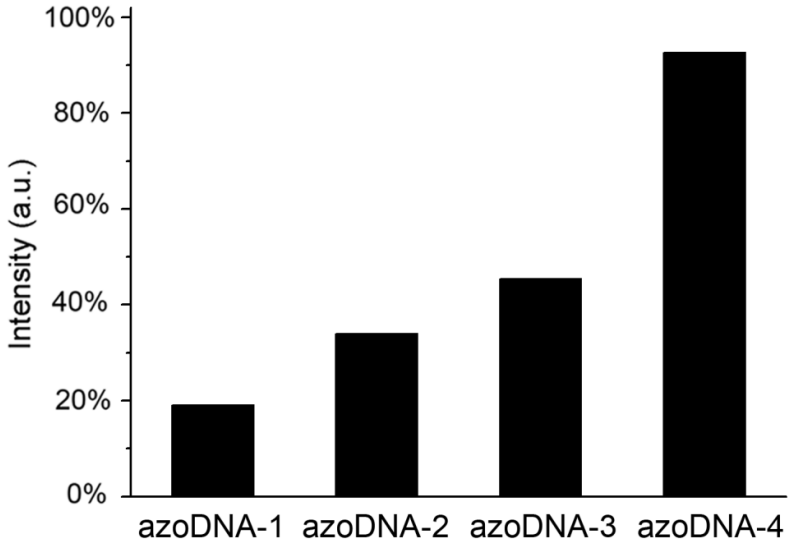


Figure S3. UV light responsive release of Rh6G toward MSN functionalized with different azobenzene incorporated DNA (azoDNA-1, azoDNA-2, azoDNA-3, and azoDNA-4) for 1500 min, as measured by fluorescence intensity.

Table S1. Surface area and pore volume of MSN.

Sample	Surface area (m^2/g)	Pore volume (m^3/g)
MSN	842.27	1.0322
DNA-functionalized-MSN	721.29	0.89402
Rh6G-loaded DNA-MSN	502.45	0.82572