Supporting information

Formation of BiOX (X=Cl and Br) in a mesoporous silica by the infiltration of Bi salts and the subsequent reaction with HX vapor

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Experimental

The preparation of SBA-15. SBA-15 was synthesized by the reported method[1] as follows, 10.0 g of P123 was dissolved in 75 g of water and 300 g of 2 M HCl solution using magnetic stirrer at 35 °C. To which solution was added 21.2 g of TEOS and the mixture was vigorously stirred at 25 °C for 20 h. The mixture was aged at 120 °C for 1 day without stirring. The product was collected by filtration, washed with water, and dried at 25 °C. P123 was removed by the calcination of the product at 500 °C for 6 h.

Characterizations

The X-ray powder diffraction patterns of the products were recorded using Bruker New D8 Advance using CuKα radiation. For Raman measurements, the samples were placed onto the glass substrate and recorded using dispersive-Raman spectroscopy (Senterra II, R20-532, Bruker). Raman spectra of the patches were measured with a 532 nm laser excitation at 10 mW with a 25 × 1000 mm aperture and a 100× microscope magnification. The spectral acquisition time was 30 s with the 3 accumulations. Scanning electron micrographs (SEM) were obtained on field emission scanning electron microscope (JEOL JSM-7610F). Prior to the measurements, the samples were coated with platinum (the thickness of 4 nm). The EDS mapping was examined by FEITF20 field emission transmission electron microscope. Transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM) images were obtained using a JEOL JEMARM200F high-resolution transmission electron microscopy equipped with EDX analyzer microscope and was operated at 200 kV. The diffuse reflectance spectra were obtained by using UV spectrometer (Perkin Elmer Lambda 1050 UV/Vis/NIR Spectrophotometer) with an integrate sphere.

Results:

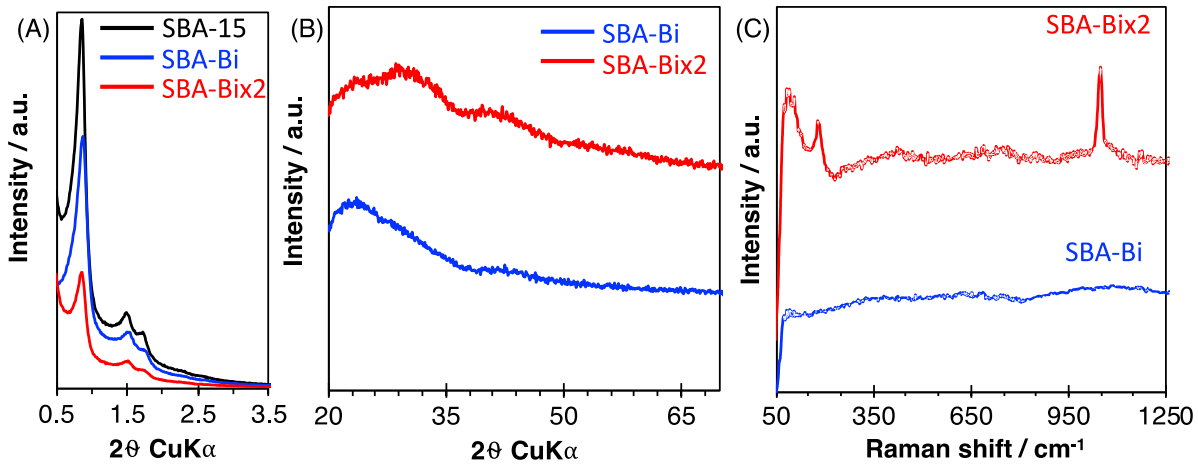

Figure S1. (A, B) X-Ray powder diffraction patterns and (C) Raman spectra of SBA-15, SBA-Bi and SBA-Bix2

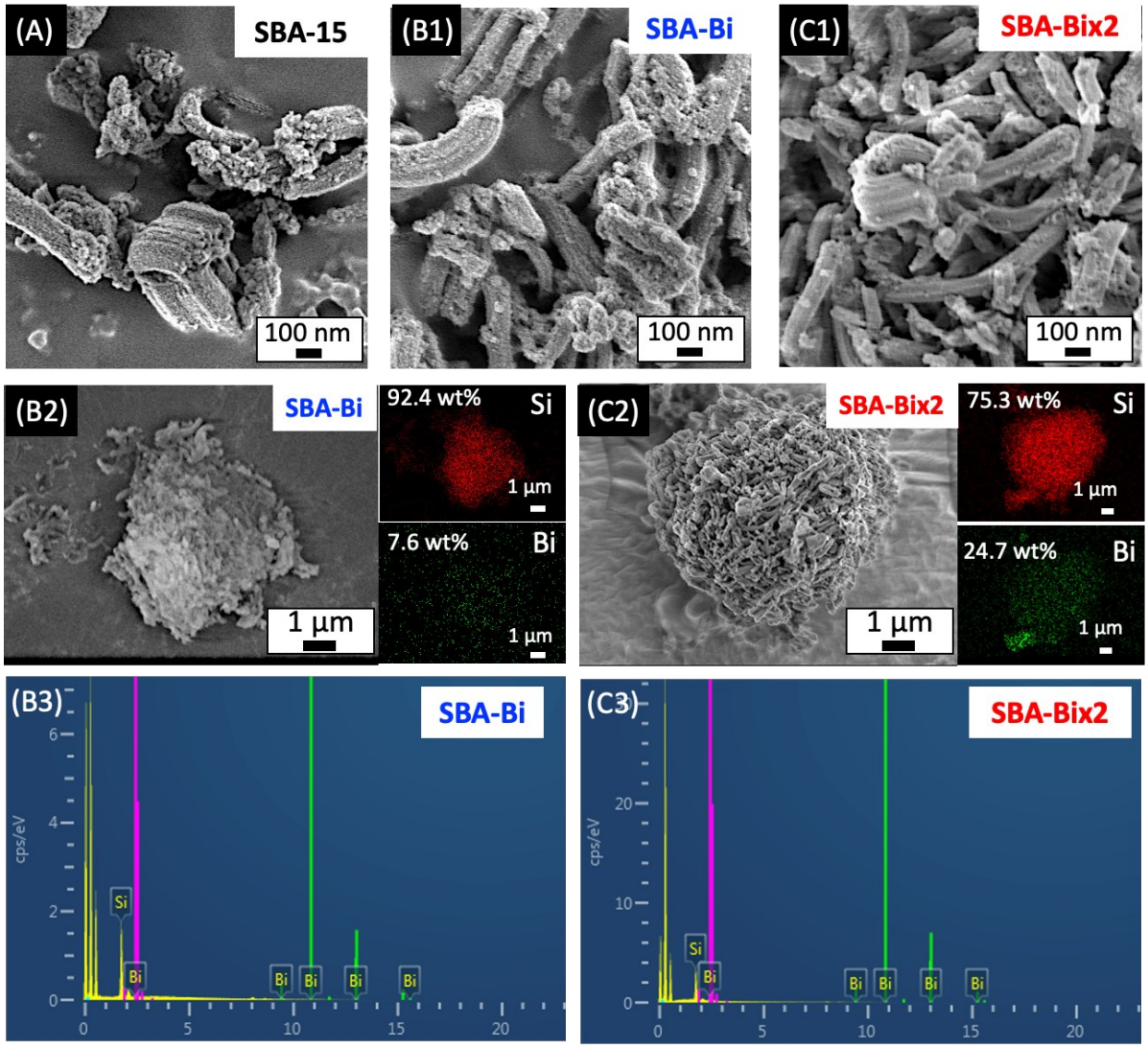

Figure S2. SEM images, EDS elemental analysis and Energy dispersive spectra (EDS) of SBA-15 (A), SBA-Bi (B1, B2, B3) and SBA-Bix2 (C1, C2, C3)

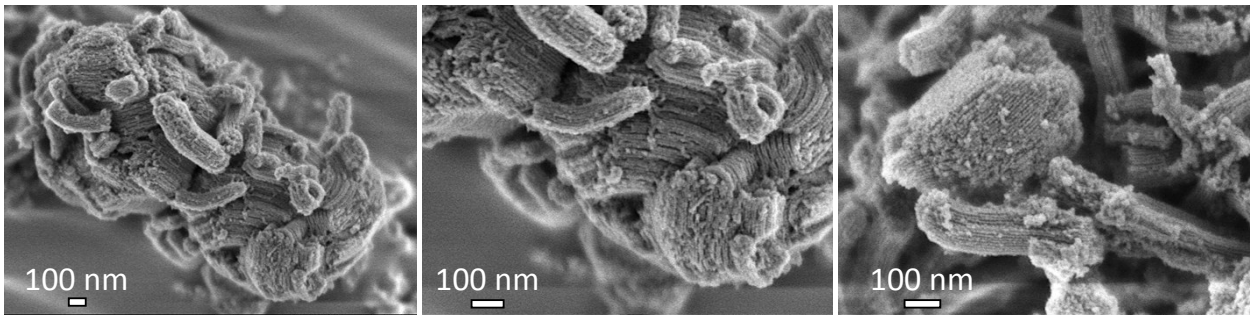

Figure S3. SEM images of SBA-Bix2-HCl-14days

Reference

1. D. Zhao, Q. Huo, J. Feng, B. F. Chmelka and G. D. Stucky, *J. Am. Chem. Soc.,* 1998, **120**, 6024-6036.