

Supporting Information

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SI Text

Structures of Electrolyte Ions. The different electrolytes were prepared by making combinations of the different anions and cations shown in [Scheme S1](#).

Preparation of Fluorinated Tetraphenyl Borate Anions. Tetrakis(3,5-bis(trifluoromethyl)phenyl)borate (1), tetrakis(4-trifluoromethylphenyl)borate (2), tetrakis(pentafluorophenyl)borate (3), and tetrakis(parafluorophenyl)borate (4) were prepared following literature procedures as the sodium or lithium salts.

Preparation of [(n-C₄H₉)₄N] [B(3,5-(CF₃)₂C₆H₃)₄]. Na[B(3,5-(CF₃)₂C₆H₃)₄] (10 g, 11.5 mmol) and [(n-C₄H₉)₄N]Br (4.2 g, 13.0 mmol) were mixed into 50 mL dichloromethane with stirring for 10 min. After filtration, the solvent was removed in vacuo. The solid residue was then dissolved in 50 mL diethyl ether and the excess [(n-C₄H₉)₄N]⁺ was removed by filtration. [(n-C₄H₉)₄N]⁺[B(3,5-(CF₃)₂C₆H₃)₄]⁻ was obtained by evaporating the solvent in vacuo.

SAXS and TEM Characterization of Calcined Silica Templates. SAXRD (small angle X-ray diffraction) patterns were recorded in the 1–8° 2θ range using a Siemens D5000 X-ray diffractometer equipped with a θ/2θ geometry goniometer. The instrument operated in reflection geometry using CuK_{α1} radiation, λ = 1.54056 Å, which was focused by a Ge crystal primary mono-

chromator. The slit arrangement was 2 mm presample slit, 0.2 mm postsample slit, and a 0.2 mm detector slit.

Diffraction patterns for a thin mesoporous silica film on ITO from a solution containing Brij 56, TMOS, and 0.5 M HCl in water in a weight ratio (1:1.8:1) and methanol (50% by weight of total solution) are shown in [Fig. S1](#) and [Fig. S2](#). The sample was rotated by 90° to give the second pattern.

The diffraction patterns depend on the orientation of the p6 mm hexagonal mesophase. A mesophase with channels oriented perpendicular to the substrate show no reflections, when the channels are oriented parallel to the substrate with the [100] face also parallel to the surface shows peaks for [100] (2θ ≈ 2.1) and [200] (2θ ≈ 4.2); when the channels are parallel to the substrate with the [110] face also parallel to the surface (2θ ≈ 3.6) (5).

TEM. TEM images were obtained from a JEOL 3010 transmission electron microscope, with an accelerating voltage ranging from 100–300 kV. The Oxford Inca 100 TEM software was used for the energy dispersive X-ray analysis.

Charge Calculations. The charge required to fill the pores in the template was estimated using Faraday's law by calculating the total volume of all of the pores within the silica template film assuming an average film thickness of 250 nm, average pore diameter (from TEM) of 3 nm, and a pore density (estimated from TEM) on 4 pores per 100 nm².

1. Brookhart M, Grant B, Volpe AF (1992) [(3,5-(CF₃)₂C₆H₃)₄B]⁻[H(OEt)₂]₂⁺: A convenient reagent for generation and stabilization of cationic, highly electrophilic organometallic complexes. *Organometallics* 11:3920–3922.
2. Vandeberg JT, Moore CE, Cassaretto FP, Posvic H (1969) Studies in the tetraarylborates: The preparation and reagent properties of sodium tetrakis(p-trifluoromethylphenyl) borate and sodium tetrakis(m-fluorophenyl) borate. *Anal Chim Acta* 44:175–183.
3. Massey AG, Park AJ (1964) Perfluorophenyl derivatives of the elements: I. Tris(pentafluorophenyl)boron. *J Organometal Chem* 2:245–250.
4. Moore CE, Cassaretto FP, Posvic H, McLafferty JJ (1966) Studies in the tetraarylborates: Part II. The preparation and reagent properties of sodium tetrakis(p-fluorophenyl)borate, a selective reagent for cesium. *Anal Chim Acta* 35:1–5.
5. Hillhouse HW, Egmond JW, Tsapatsis M, Hanson JC, Larese JZ (2001) The interpretation of X-ray diffraction data for the determination of channel orientation in mesoporous films. *Micropor Mesopor Mat* 44–45:639–643.

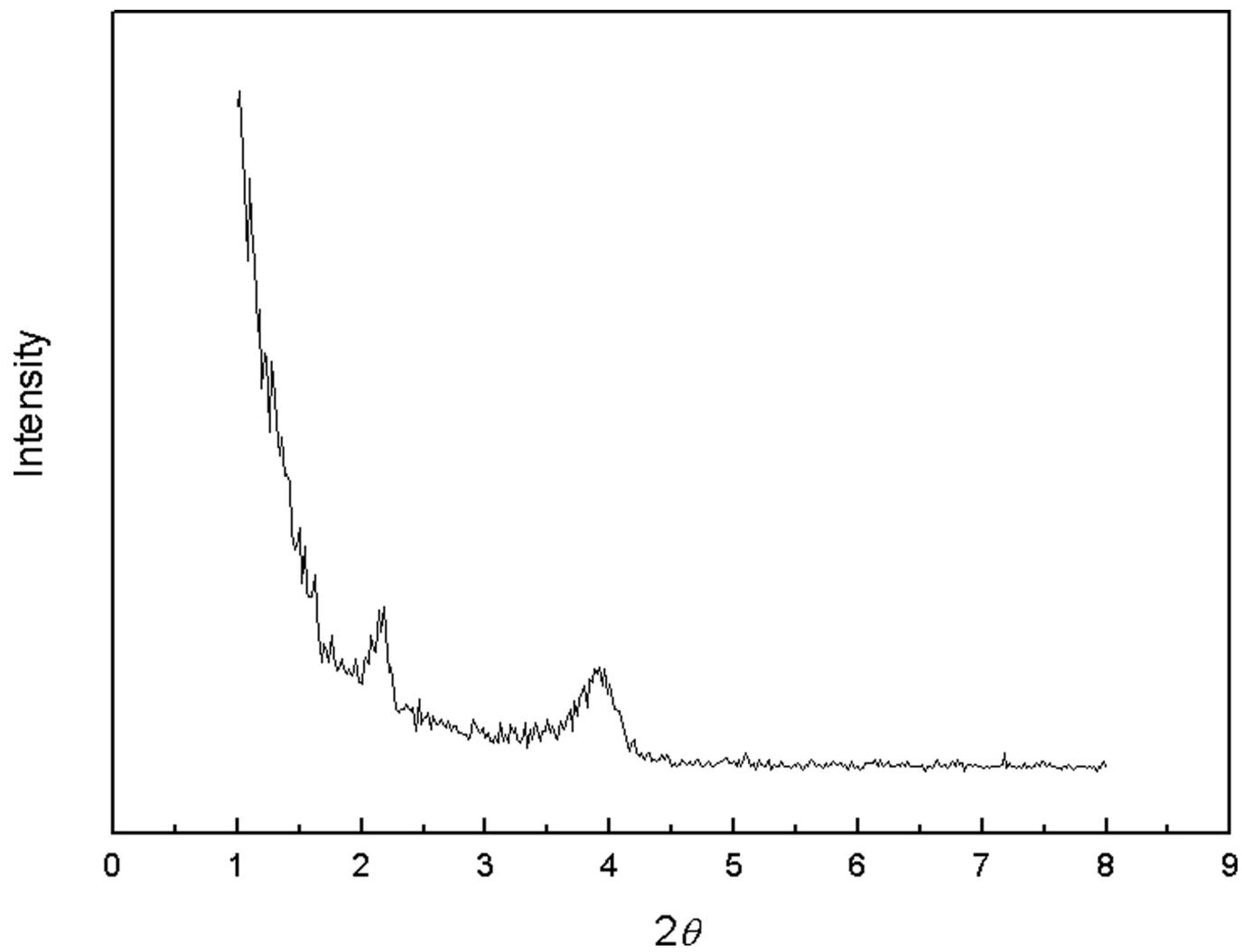


Fig. S1. SAXRD for the mesoporous silica template.

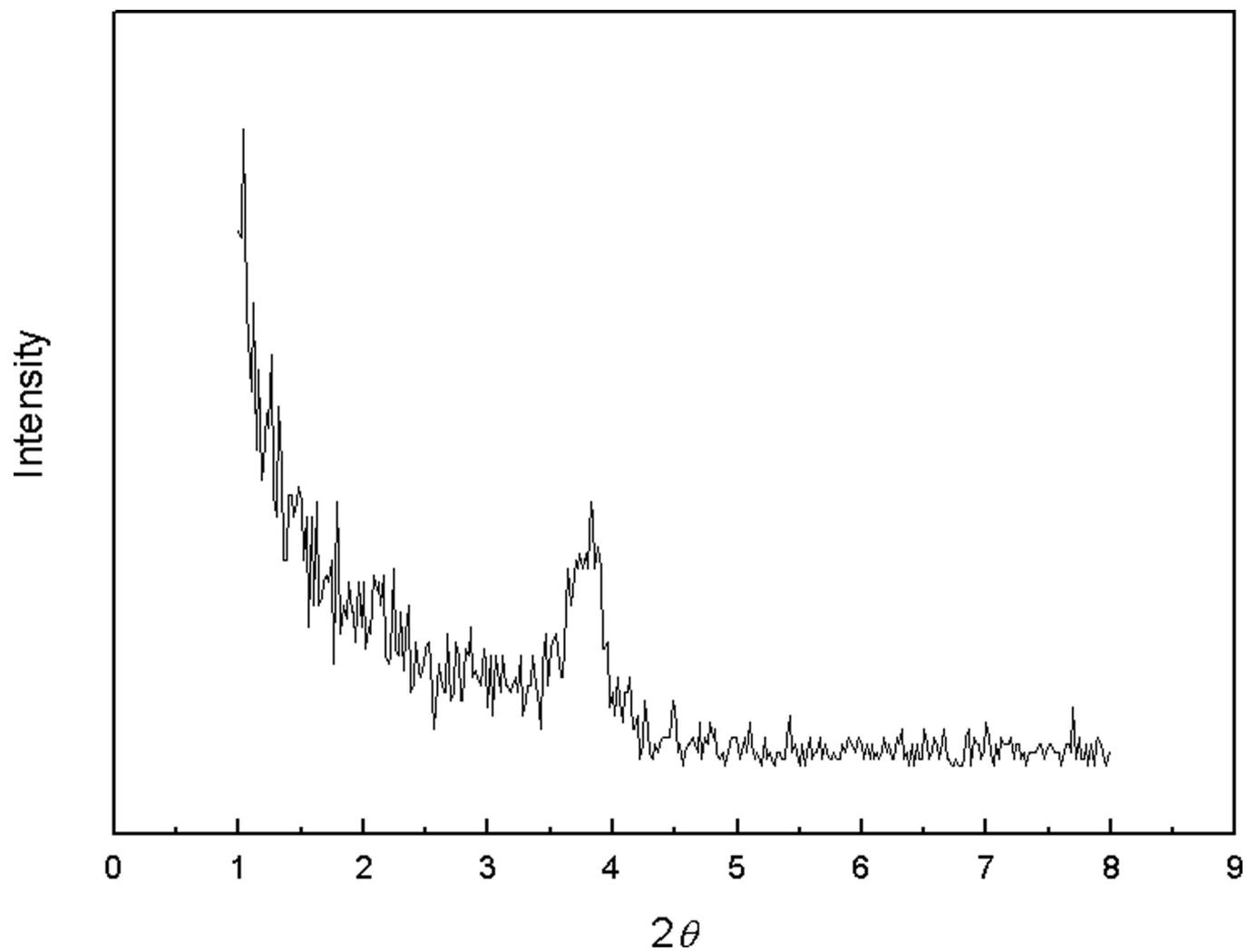


Fig. S2. S1 SAXRD for the mesoporous silica template after rotation through 90° relative to the data in Fig. S1.

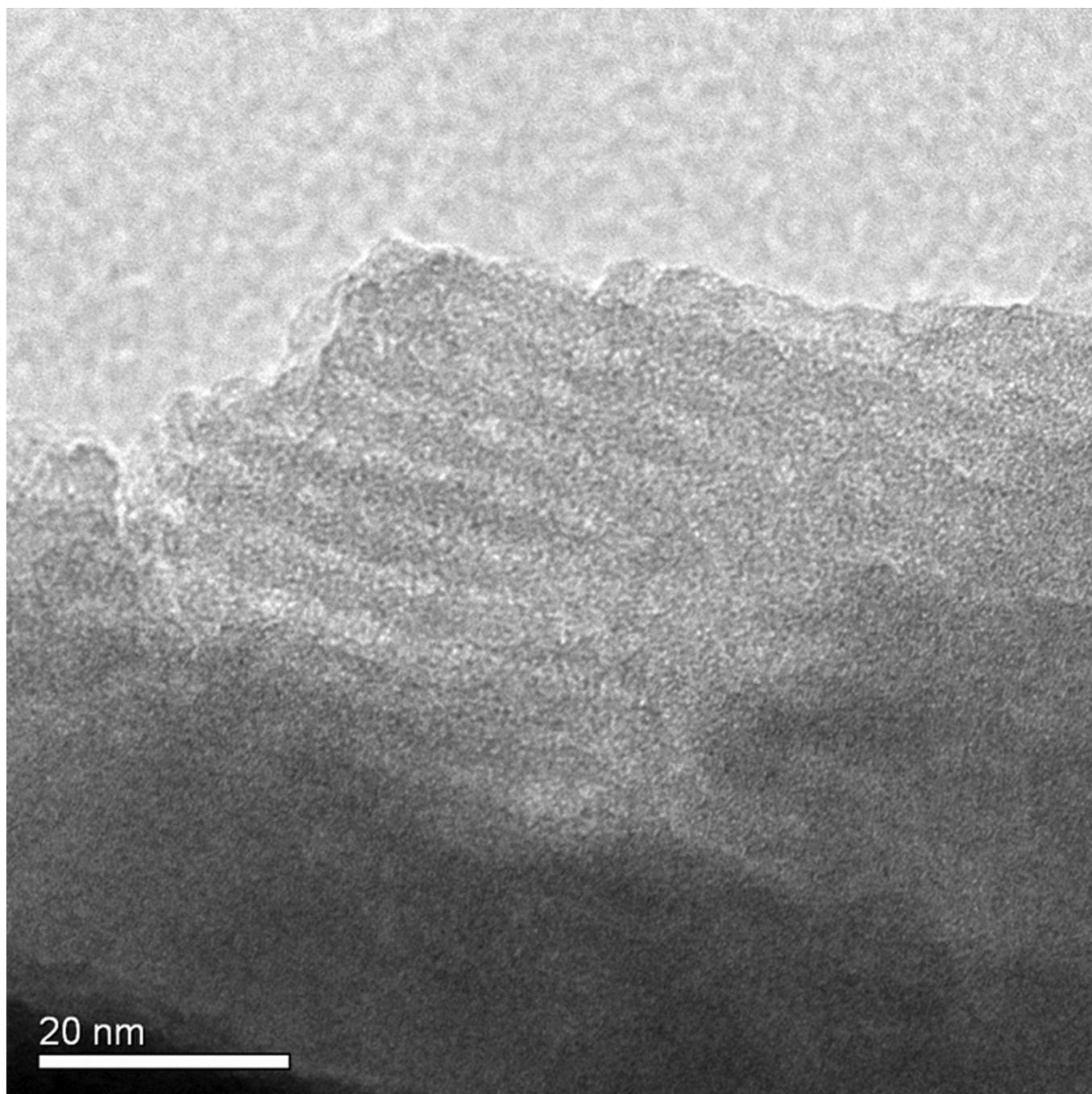
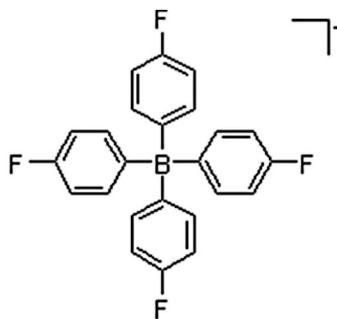
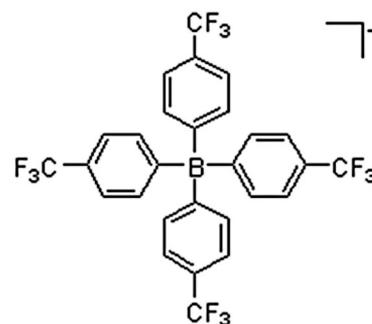


Fig. S3. TEM image of the mesoporous silica template after calcining.

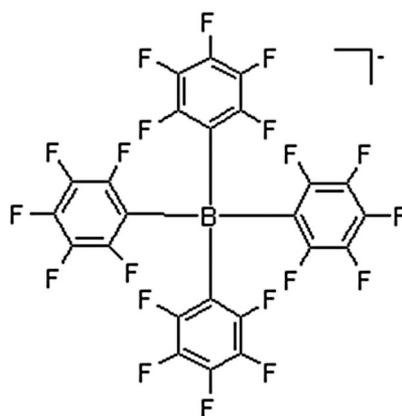
Anions:



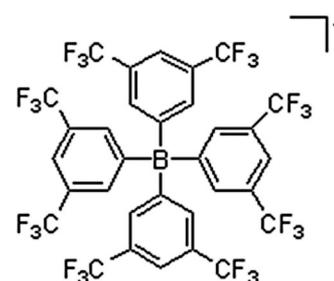
BARF-1



BARF-3

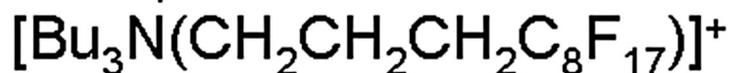


BARF-5



BARF-6

Cations:



Scheme S1. The different anions and cations.