

## Supporting Information

### **Enhanced forward osmosis desalination with a hybrid ionic liquid/hydrogel thermo-responsive draw agent system**

Chih-Hao Hsu<sup>a</sup>, Canghai Ma<sup>a</sup>, Ngoc Bui<sup>a</sup>, Zhuonan Song<sup>a</sup>, Aaron D. Wilson<sup>b</sup>, Robert Kostecki<sup>c</sup>, Kyle M. Diederichsen<sup>d</sup>, Bryan D. McCloskey<sup>d</sup>, Jeffrey J. Urban<sup>\*,a</sup>

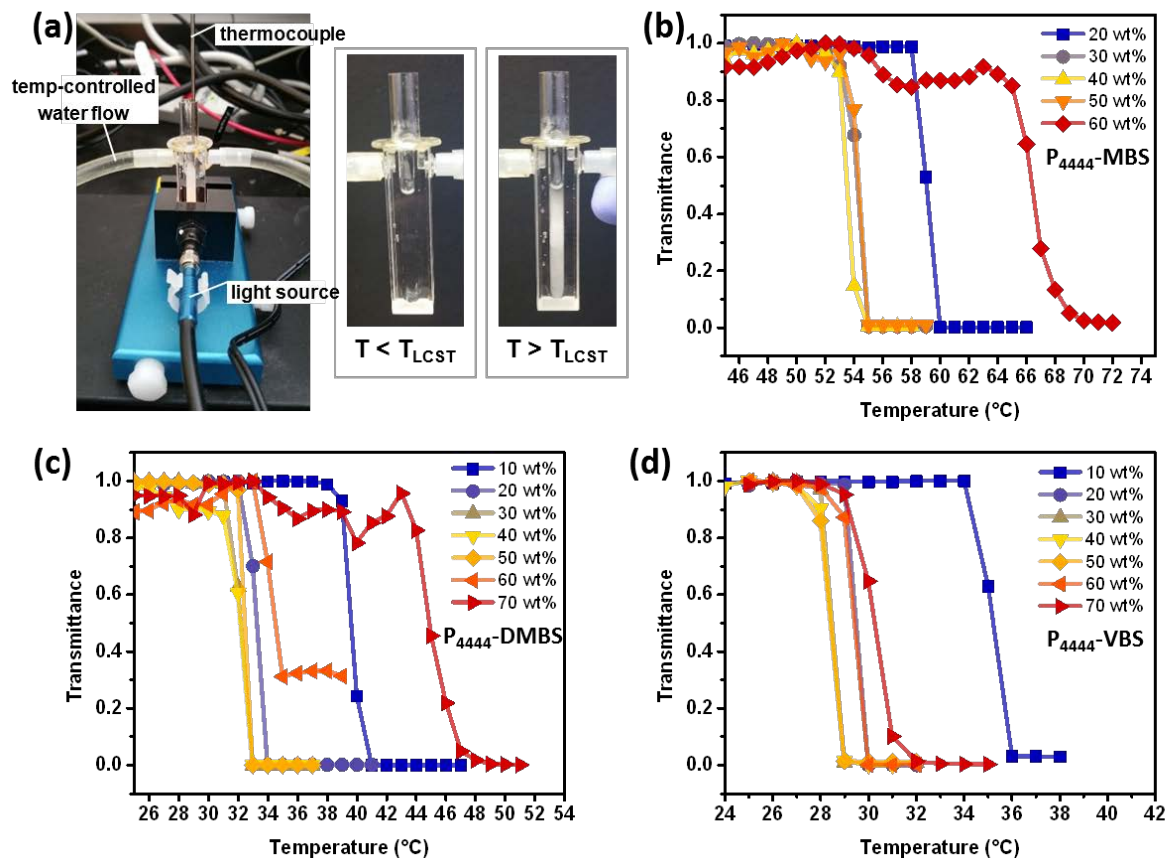
<sup>a</sup> *The Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA*

<sup>b</sup> *Idaho National Laboratory, P.O. Box 1625 MS 2208, Idaho Falls, ID 83415, USA*

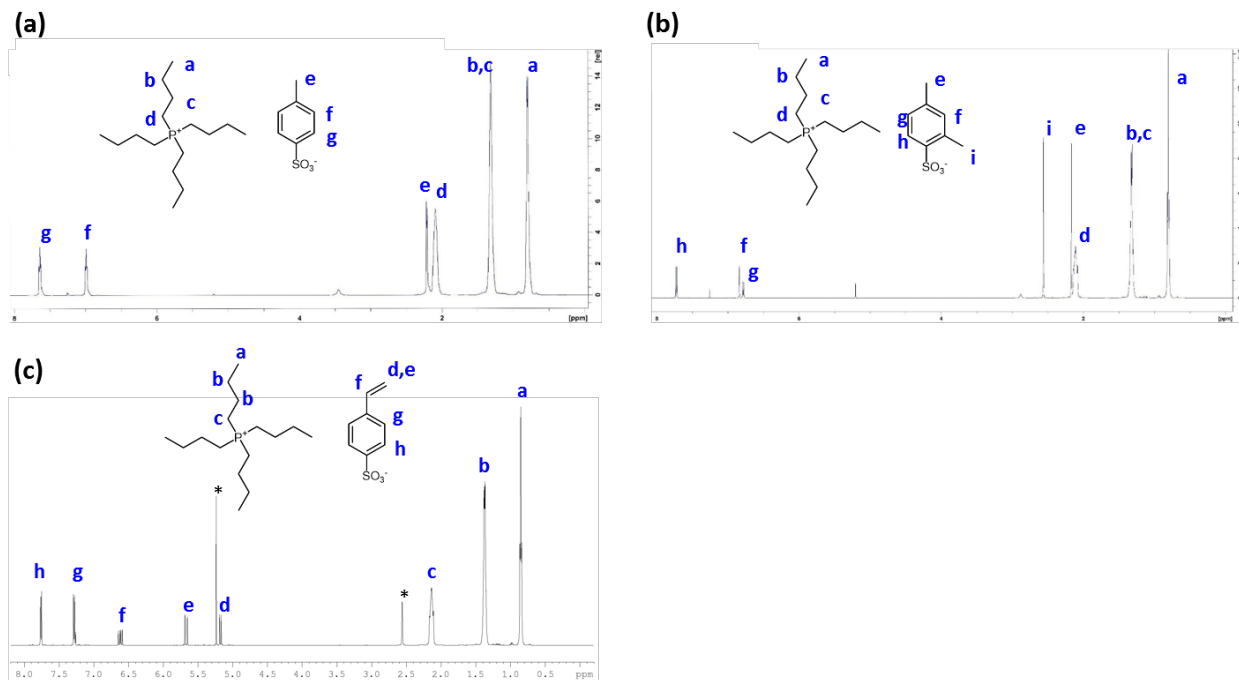
<sup>c</sup> *Energy Storage and Distributed Resources Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA*

<sup>d</sup> *Department of Chemical and Biomolecular Engineering, University of California, Berkeley, California 94720, USA*

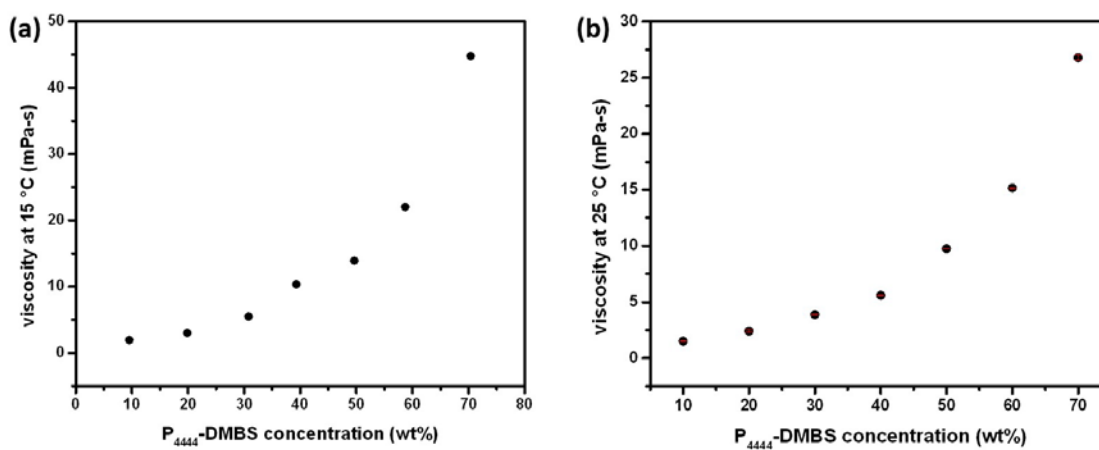
\*Corresponding author: [jjurban@lbl.gov](mailto:jjurban@lbl.gov)



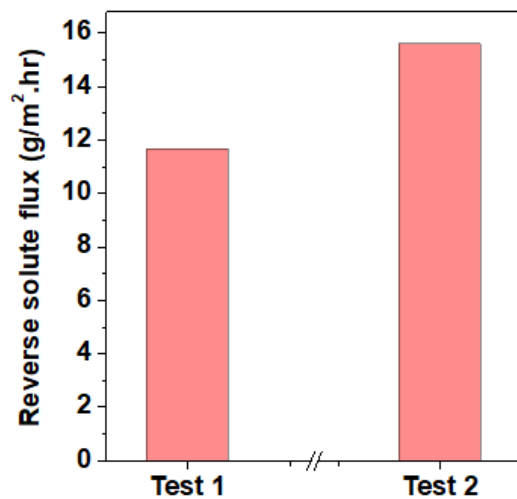
**Figure S1.** The LCSTs of ILs were determined by monitoring the transmittance of light ( $\lambda = 600$  nm) via (a) the temperature-controlled UV-Vis setup. The turbidity change below and above the LCST was demonstrated by the 10 wt%  $P_{4444}$ -VBS solution. The turbidity curves of (b)  $P_{4444}$ -MBS, (c)  $P_{4444}$ -DMBS, and (d)  $P_{4444}$ -VBS.



**Figure S2.**  $^1\text{H}$  NMR spectra of (a)  $\text{P}_{4444}\text{-MBS}$ , (b)  $\text{P}_{4444}\text{-DMBS}$ , and (c)  $\text{P}_{4444}\text{-VBS}$ .



**Figure S3.** Viscosities of 10, 20, 30, 40, 50, 60, and 70 wt%  $\text{P}_{4444}\text{-DMBS}$  aqueous solutions (a) measured by the falling bob method at 15 °C, and (b) measured by an electromagnetically spinning viscometer at 25 °C.



**Figure S4.** Reverse solute fluxes performed by our binary draw system-of-interest. Traces of ILs were measured with ICP-OES. An average reverse flux value of  $13.6 \pm 2.7$  g/m<sup>2</sup>·hr ( $0.031 \pm 0.006$  mol/m<sup>2</sup>·hr) of P<sub>4444</sub>-DMBS was observed in the IL/hydrogel binary draw system process.