

## *Supplementary Information*

### **Critical role of zeolites as H<sub>2</sub>S scavengers in argyrodite Li<sub>6</sub>PS<sub>5</sub>Cl solid electrolytes for all-solid-state batteries**

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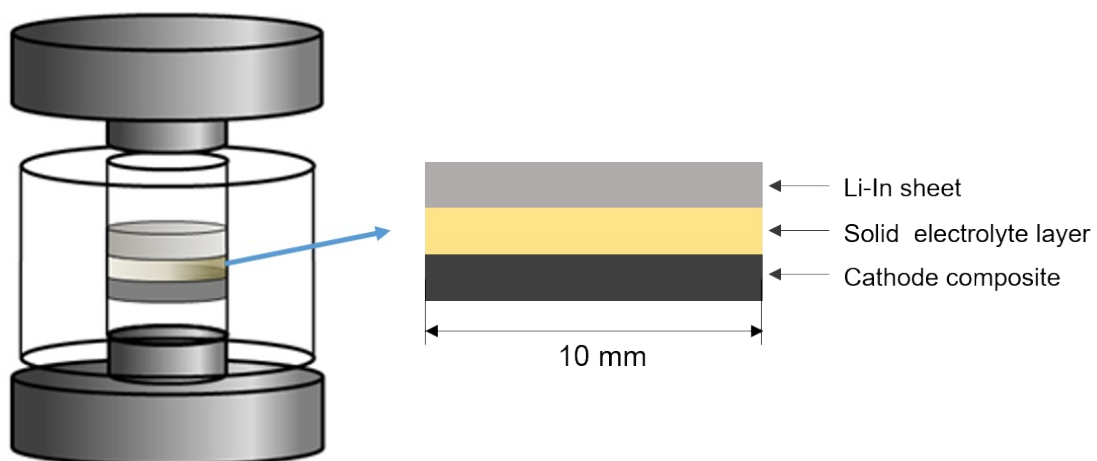
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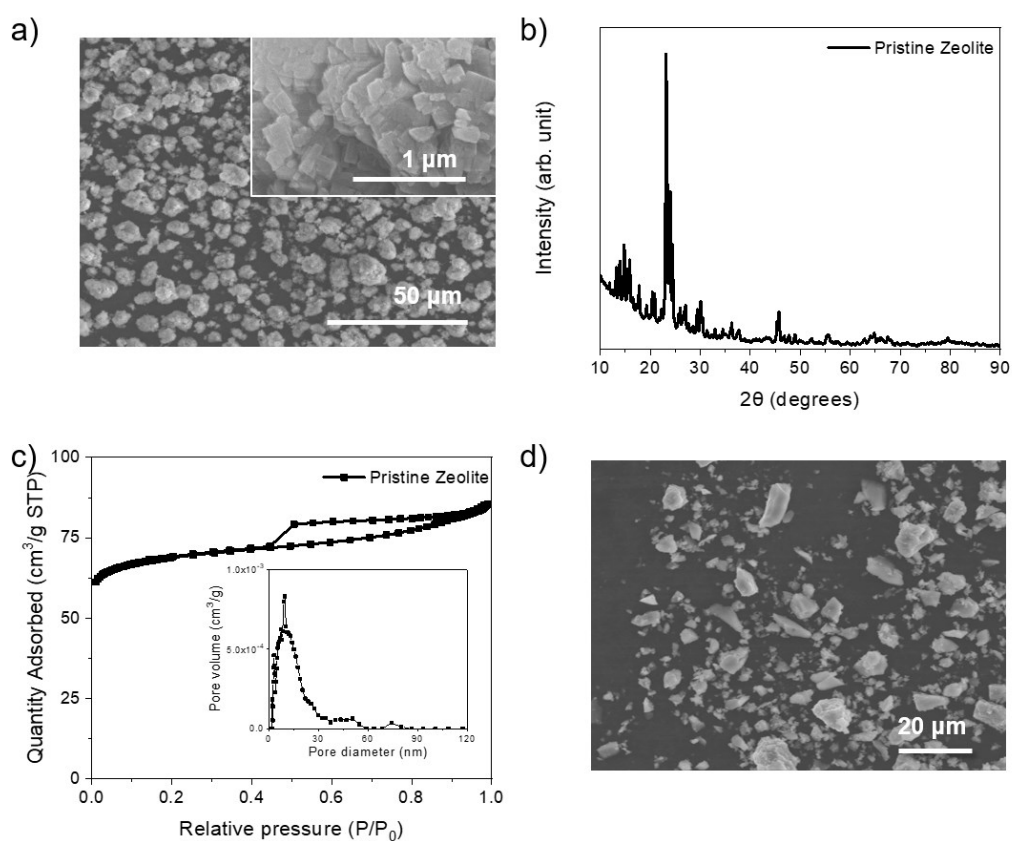
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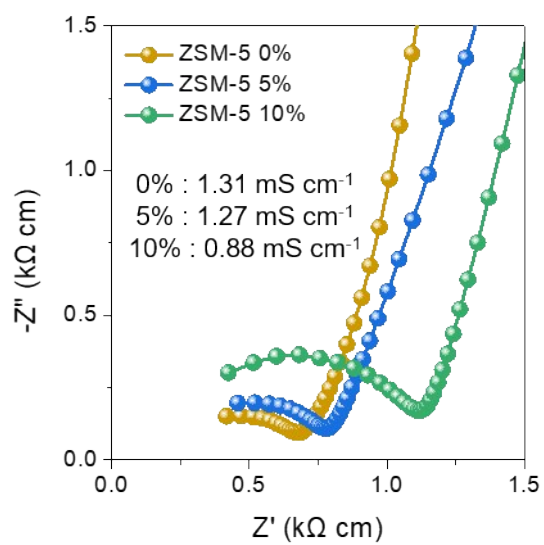
cho4153@keti.re.kr (W. Cho) and mspark@khu.ac.kr (M.-S. Park)



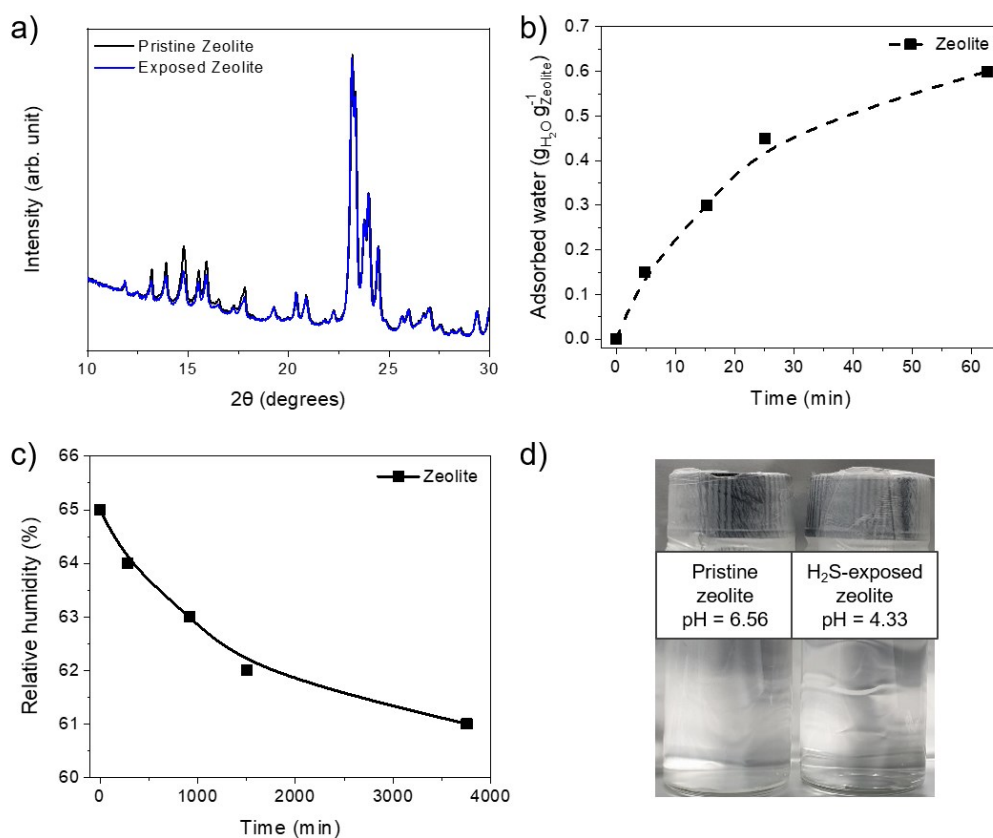
**Fig. S1** A schematic for cell configuration of ASSB assembled with P-Li<sub>6</sub>PS<sub>5</sub>Cl and Z-Li<sub>6</sub>PS<sub>5</sub>Cl.



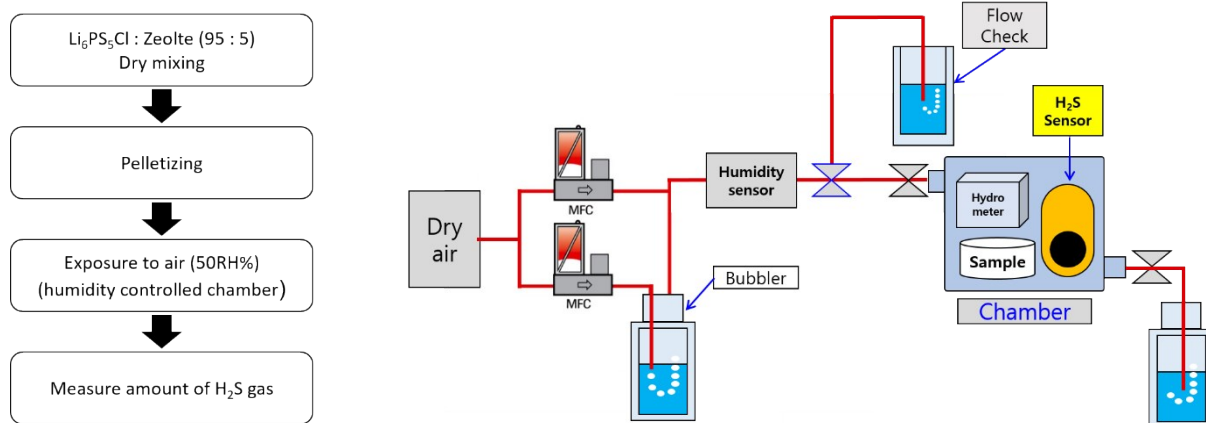
**Fig. S2** (a) FESEM images of ZSM-5 zeolite particles at different magnifications, (b) XRD pattern, (c) N<sub>2</sub> isotherm curve and pore distribution (inset) of ZSM-5 zeolite particles. (d) FESEM image of P-Li<sub>6</sub>PS<sub>5</sub>Cl solid electrolyte.



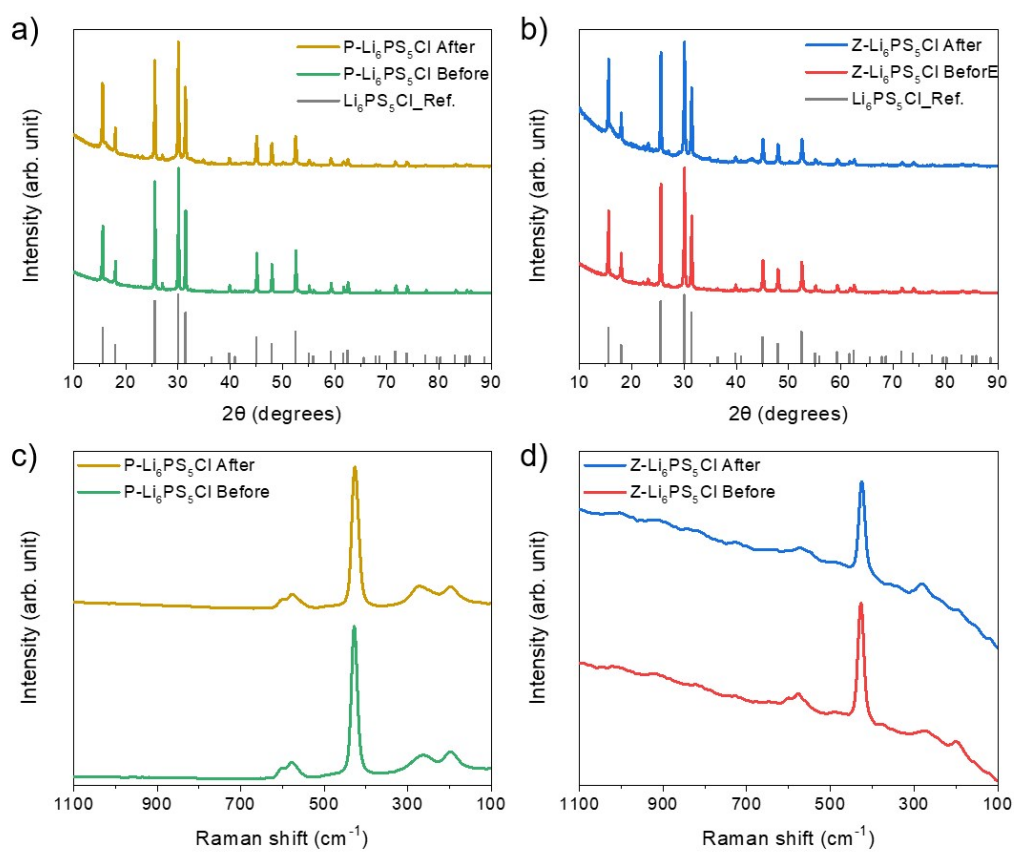
**Fig. S3** Ionic conductivities of Z-Li<sub>6</sub>PS<sub>5</sub>Cl with different contents of ZSM-5 zeolite particle.



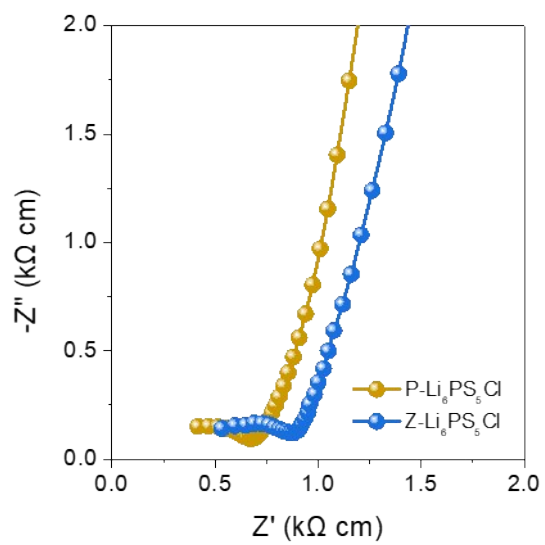
**Fig. S4** (a) XRD patterns of ZSM-5 zeolite particles before and after storage in the chamber under a controlled atmosphere with a relative humidity (RH) of 50%. (b) H<sub>2</sub>O adsorption behavior of the zeolite and (c) relative humidity in the chamber as a function of storage time. (d) Corresponding pH values of pristine and H<sub>2</sub>S exposed zeolite particles after storage.



**Fig. S5** Schematic of quantitative measurements for H<sub>2</sub>S concentration as a function of storage time in a sealed chamber under a controlled atmosphere (RH 50%).



**Fig. S6** XRD patterns of (a) P-Li<sub>6</sub>PS<sub>5</sub>Cl and (b) Z-Li<sub>6</sub>PS<sub>5</sub>Cl, and Raman spectra of (a) P-Li<sub>6</sub>PS<sub>5</sub>Cl and (b) Z-Li<sub>6</sub>PS<sub>5</sub>Cl before and after cycling.



**Fig. S7** Nyquist plots of P-Li<sub>6</sub>PS<sub>5</sub>Cl and Z-Li<sub>6</sub>PS<sub>5</sub>Cl before exposure to humid air (RH50%).