

Supplementary information

All-Solid-State Nanocomposite Electrolytes Composed of an Ionic Polymer with Polar Groups and Surface-Modified SiO_2 Nanoparticles for Dye-Sensitized Solar Cells

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Fig. S1 shows the TEM images of SiO_2 nanoparticles in sizes of 7-10 nm and 20-30 nm. **Fig. S1a** shows KH550-modified SiO_2 in size of 7-10 nm, where the inset on the left-top side is the naked SiO_2 nanoparticles in size of 7-10 nm. KH570-modified SiO_2 nanoparticles in size of 20-30 nm are shown in **Fig. S1b**, where the inset on the left-top side is the naked SiO_2 nanoparticles in size of 20-30 nm.

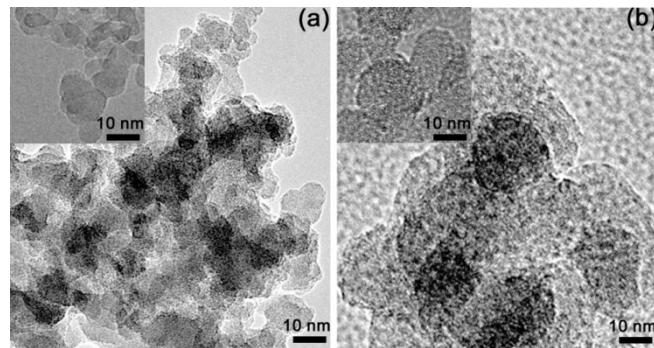


Fig. S1 TEM images of (a) modified SiO_2 in sizes of 7-10 nm with the inset of naked SiO_2 in sizes of 7-10 nm and (b) modified SiO_2 in sizes of 20-30 nm with the inset of naked SiO_2 in sizes of 20-30 nm.

Fig. S2 shows the FT-IR spectra of 2,3-dichloropropionic and ionic polymer. The band at about 630 cm^{-1} is attributed to the vibration of $-\text{COOR}$. The characteristic peak at 704 cm^{-1} is ascribed to C-Cl bond. The peaks at $\sim 770 \text{ cm}^{-1}$, $\sim 840 \text{ cm}^{-1}$, $\sim 900 \text{ cm}^{-1}$, and $\sim 1000 \text{ cm}^{-1}$ are attributed to the vibration of C-H, C-O-C, C-N, and stretching vibration of C-O, respectively.

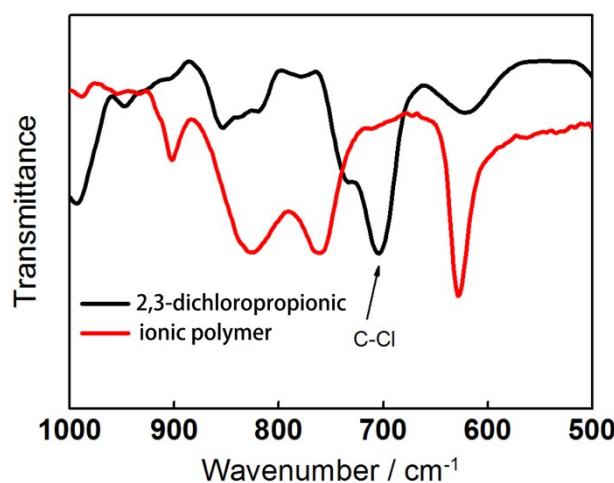


Fig. S2 FT-IR spectra of 2,3-dichloropropionic and ionic polymer.

Fig. S3 shows the TGA curves of modified SiO_2 particles. Modified SiO_2 particles (a-KH570, b-KH570, and a-KH550) do not have a distinct weight loss before 200 $^{\circ}\text{C}$. For modified SiO_2 particles of the same size (7-10 nm), the weight loss of a-KH550 and a-KH570 from 200 to 800 $^{\circ}\text{C}$ are 8.05 wt% and 9.08 wt%, respectively. The weight loss of b-KH570 from 200 to 800 $^{\circ}\text{C}$ (in size of 20-30 nm) is 7.14 wt%.

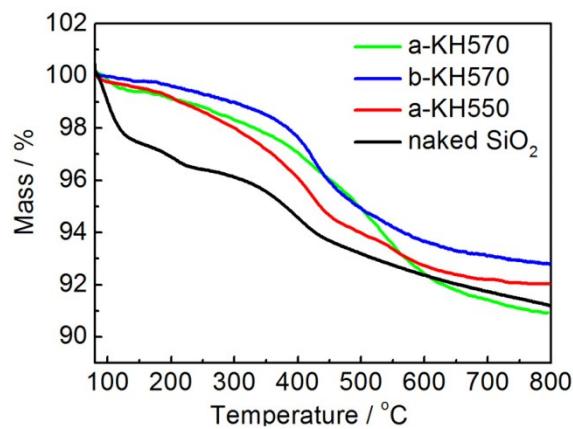


Fig. S3 TGA curves of a-KH570, b-KH570, and a-KH550.