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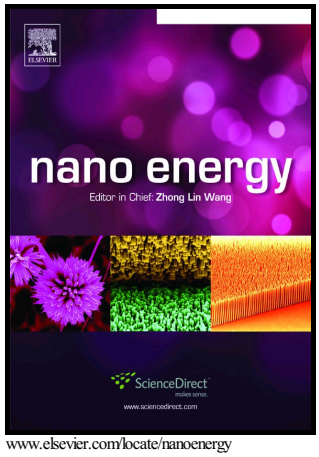

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An effective polysulfides bridgebuilder to enable long-life lithium-sulfur flow batteries

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Abstract:

Polysulfides shuttle, although is not the only one, but definitely the most prominent problem which hinders the commercialization of lithium-sulfur cells. Herein, a functionally designed SiO_2 tethered 1-methyl-1-propylpiperidinium chloride (SiO_2-PPCl) ionic-liquid nanoparticle is adopted as a bridgebuilder between the carbon carrier and lithium polysulfides (LPS) to modulate shuttle issues. The SiO_2-PPCl exerts effective adhesion to both polar LPS and nonpolar carbon carrier material by its special function groups, which make it act as a bridge between them, therefore, the dissolved LPS are prevented from migrating to lithium anode effectively, and the corresponding LPS shuttle is controllable by simply tuning the ratio of SiO_2-PPCl to sulfur. This strategy is demonstrated in a lithium sulfur suspension flow cell in which the shuttle effect is more serious because large quantity of electrolyte is adopted, and