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# Highly porous single ion conducting polymer electrolyte for advanced lithium-ion batteries via facile water-induced phase separation process

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## ABSTRACT

Development of Li-ion battery electrolyte with high performance electrochemical properties and high safety is still big challenge. Single ion conducting polymer electrolytes with high porous, superior electrolyte wettability and excellent thermal dimensional stability are attracting increasing attentions for meeting the requirement. Herein, the fabrication of the highly porous single ion conducting polymer electrolyte membrane (SIPE) by the non-solvent phase separation process (NIPS) using water as the coagulation bath solvent was firstly reported. The key properties of porosity, solvent uptake, mechanical strength and electrolyte wettability were systematically investigated and compared to that of the porous SIPE using chloroform as the coagulation bath solvent and commercial PP separator. The results indicate that the water induced NIPS process is a facile way to for preparation of highly porous SIPE. The uniform and interconnected porous SIPE with high porosity of 73.5% and solvent uptake of 537.9wt% was successfully obtained. As a consequence, the excellent electrochemical performances of the LIBs assembled by the porous SIPE were achieved.

*Keywords:* Lithium ion batteries, single ion conducting polymer electrolyte, non-solvent phase inversion, porosity.

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