

Scalable approach to porous PVDF-HFP thin film as separator for lithium ion battery

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Poly(vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP) membranes have been receiving wide attention because of their diversified range of applications in various fields such as separators for energy storage devices, filtration as well as separation processes, and templates for microfabrication. The production of PVDF-HFP membrane with highly controlled porosity in a scalable and cost-effective way is crucially necessary. In this work, we report on the fabrication of PVDF-HFP membrane by facile single-step solution-immersion dip-coating method. Herein, the porous membrane is generated based on the concept of evaporation-induced phase separation of a ternary solution which composes of polymer in a mixture of acetone and water as solvent/nonsolvent pair. The porous film showed the multi-layered honeycomb-like cellular structure. The structural morphology and porosity of the membrane can be regulated by changing solution composition or drying conditions. Gel polymer electrolytes composed of PVDF-HFP microporous membrane incorporating BMIMTFSI:LiTFSI are characterized as the electrolytes in lithium-ion batteries.