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Journal of Thermodynamics and Catalysis

Photopolymerization Based Solid-state Electrolytes for Lithium Metallic Batteries

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Abstract

UV-curing allows to obtain of a highly cross-linked solid-state polymer electrolyte membrane that was designed for the use of lithium metallic batteries (LMBs). The vital composite electrolyte membrane was successfully fabricated by PEO and (LATP) in the presence of UV photo-polymerization. The cross-linked solid-state Electrolytes can accommodate a liquid electrolyte inside the membrane via strong interaction with lithium-ion and solvents. Solid-state Electrolytes membrane shows much higher mechanical properties than pure PEO based electrolyte. The conductivity of CGPE reached about 3.3 10-3 S cm-1 at room temperature, lithium transference number were observed 0.77 and presented a wider electrochemical stability window (ESW) at room temperature. Most importantly, the fundamental function of LATP is to support in building a stable solid-electrolyte-interphase (SEI) and limits the growth of dendrites. The solid electrolyte interphase (SEI) formed between lithium metal and liquid electrolytes plays a critical role in all of these processes. The prepared ceramic-based electrolytes effectively render to inhibit lithium dendrite growth in asymmetrical cell Li/SPE/Li test during charge/discharge at a current density of 2 mAcm-2. In addition, the battery assembled of LiFePO4/SPE/Li exhibits superior charge/discharge cycling. This provide a fundamental strategy that the ceramic-based electrolytes design a prime solution for high-performance lithium-metal batteries.

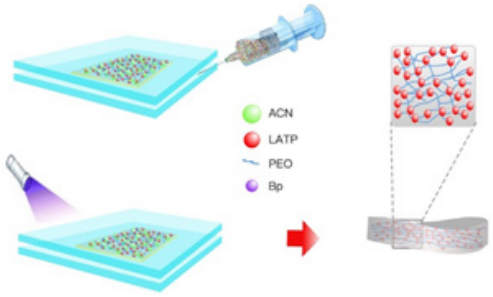

Fig.1 UV based solid-state polymer electrolyte

Biography

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Citation: Sajid Hussain Siyal Photopolymerization Based Solid-state Electrolytes for Lithium Metallic Batteries, Chemistry 2020, 2nd Global Experts Meeting on Chemistry and Medicinal Chemistry, Prague, Czech Republic, August 26-27, 2020, 05