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DESIGN AND DEVELOPMENT OF SOLID STATE ELECTROLYTE BY USING THE NOVEL STRATEGY OF UV FOR ENERGY STORAGE DEVICES (LITHIUM ION BATTERIES)

Sajid Hussain Siyal[1a], Muhammad Sufyan Javed[2], Abdul Qadir[1]

[1]Department of Metallurgy and Materials Engineering, Dawood University of Engineering and Technology, Karachi 74800, Sindh, Pakistan

[2] Siyuan Laboratory, Guangzhou Key Laboratory of Vacuum Coating Technologies and New Energy Materials, Jinan University, Guangzhou, Guangdong 510632, PR China

[1a] sajid.hussain@duet.edu.pk, https://orcid.org/0000-0002-9041-0649 ;

[2] safisabri@gmail.com, https://orcid.org/0000-0002-2771-0251

Abstract

Lithium Ion batteries (LIBs) are promising energy storage devices due to the high capacity and lower negative electrochemical potential. Nevertheless, their concrete applications remain disturbed by unbalanced electrolyte-electrode interfaces, limited electrochemical window, and high-risk. Herein, a novel strategy to obtain ceramic-based electrolytes that possess great potential in energy storage due to their higher level of energy densities in LMBs. UV Irradiation allows to obtain of a highly cross-linked solid-state electrolyte membrane that was designed for the use of energy storage devices. The membrane was successfully fabricated by polymer and nanofillers of ceramics with the help of UV photo-polymerization. The cross-linked solid-state membrane can accommodate a liquid inside the membrane via strong interaction with lithium-ion and solvents. Solid-state membrane that shows much higher mechanical properties than pure PEO based electrolyte. The fundamental function of ceramic nanoparticles is to support in building a stable electrolyte interphase (SEI) and suppress the growth of dendrites. The prepared ceramic-based electrolyte effectively renders to inhibit lithium dendrite growth in asymmetrical cell Li/SSE/Li test during charge/discharge at a current density of 2 mAcm-2. In addition, the battery assembled of LiFePO4/SSE/Li exhibits superior charge/discharge cycling. This provides a fundamental strategy that to improve the applications of energy storage devices performance.

***Keywords**: UV irradiation, battery, electrolyte, lithium dendrite, electrolyte*