The low-crystallinity PVDF/PMMA/PEG/TiO₂ Type Polymer Diaphragm Prepared by Phase Inversion Method

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In order to improve the lithium ion battery of Poly-Vinylidene Fluoride (PVDF) conductivity and decrease crystallization of PVDF based polymer separator, introducing Poly-Methyl-Methacrylate (PMMA) and Poly-Vinylidene Fluoride (PVDF) to blend and doping organic additives PEG and inorganic nanomaterials TiO₂. The PVDF/PMMA/PEG/TiO₂ typed polymer diaphragm was prepared by Phase inversion method. Through the analysis of the porosity, ionic conductivity, charging and discharging to test, micro-morphology and electrochemical properties of the prepared PVDF/PMMA/PEG/TiO₂ porous separators, the optimum technological conditions for the preparation of the separator is polymer concentration of 8%, PMMA of 30% and PEG of 30%; the content of nanometer TiO₂ is 5%; the content of C₂H₅OH is 3%; the reaction temperature is 45°C, and the temperature is 30%. Under the best scheme, the crystallinity of the prepared polymer diaphragm is lower than that of the pure PVDF diaphragm. The porosity of the polymer diaphragm is 81.5%. The ionic conductivity is 5.2mS/cm, the tensile strength is 1183kg/cm². The electrochemical stability window is 4.68v, which is higher than 4.5v. It can meet the normal working requirements of lithium-ion batteries.

Keywords: polymer separator, phase inversion, low-crystallinity, nanomaterials, TiO₂

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