

Lithium Polymer Cells assembled by In-Situ Chemical Cross-linking with Composite Cathode containing Reactive Ceramic Particles

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Rechargeable lithium polymer batteries have been considered to be one of the most important next-generation power sources for portable electronic devices, electric vehicles and energy storage systems. In our recent work, the cross-linked gel polymer electrolytes have been prepared for application in lithium-ion polymer batteries [1-3]. In order to improve the interfacial properties between electrodes and electrolyte in the cell, we synthesized the reactive ceramic particles containing vinyl groups which permit the in-situ chemical cross-linking with electrolyte precursor containing cross-linking agent. The composite electrode was then prepared by mixing $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ active materials, conductive agent, polymer binder and reactive ceramic particles. The lithium polymer cell was assembled by sandwiching the polypropylene separator (Celgard 2400) soaked with a precursor electrolyte solution between the lithium anode and the $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ composite cathode. After the cell assembly, the cells were kept at 80 °C for 60 min in order to induce in-situ thermal curing of the precursor electrolyte solution within the cell. The chemical cross-linking was proved to promote strong interfacial adhesion between the composite electrode and the separator. In this work, the electrochemical performances of lithium polymer cells assembled by in situ chemical cross-linking will be presented. More attention will be paid to the influences of the content of reactive ceramic particles in the composite cathode on cycling performances of the lithium polymer cells.

References

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