Xanthan Gum as a Potential Binder for Graphite Anode in Lithium-Ion Batteries

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As an important component of the electrode, the choice of appropriate and favorable binder is significant for fabricating lithium-ion (Li-ion) batteries with good cycle stability and C-rates capacity, which are implemented for numerous applications especially in portable electronics and eco-friendly electric vehicles (EV). In this work, xanthan gum was used as binder for graphite anode, the adhesive strength of the active materials to the current collector was investigated by scratch test. The results confirmed that the xanthan gum (XG) had a better bonding performance with copper (Cu) foil than poly (vinylidene fluoride) (PVDF), as well as XG had a larger plastic deformation resistance than the PVDF. Electrochemical impedance spectroscopy (EIS) measurement demonstrated that the graphite electrode using XG as binder has lower charge transfer resistance and more active kinetics on the electrode/electrolyte surface. All the electrochemical performance tests indicated that XG binder for graphite anode in Li-ion battery had a better cycling and rate performance than PVDF binder for graphite anode in Li-ion battery.

Keywords: scratch test, xanthan gum, electrochemical performance, graphite anode, Li-ion battery.