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# An Amorphous Carbon-Graphite Composite Cathode for Long Cycle Life Rechargeable Aluminum Ion Batteries

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Natural graphite is investigated as the cathode for aluminum ion batteries in recent years. However, some drawbacks of the natural graphite such as severe volume swelling shorten its lifetime. In this work, we prepared a composite material by depositing an amorphous carbon on the graphite paper. The composite was used as a cathode to study the electrochemical performance in aluminum ion batteries. The charge/discharge results showed that the composite could exhibit a longer cycle life than the graphite paper. Electrochemical analyses demonstrated that the interface between the amorphous carbon and the graphite paper made a major contribution to the improvement of the cycling stability.

*Keywords:* Amorphous carbon, Graphite paper, Aluminum ion batteries, Cathode, Ionic liquid, Interface, Phase equilibrium

## 1. Introduction

Lithium ion batteries have been widely used in portable devices in the past few years, but the shortcomings such as limited power density, high cost and safety risk still restrict their further applications in electric vehicles or smart grid fields. For a sustainable modern society, it

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