Carbon Biowaste Anodes in Na+ Batteries to Reduce Environmental Impact

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With the exponentially increasing use of lithium-ion batteries for electric vehicles and large-scale energy storage requirements, such as from solar or wind turbine generated power, the urgent need for a cleaner, more sustainable energy storage solution is now paramount. To address these growing environmental concerns, this project focuses on two important technical issues. The first is using biowaste materials such as coconut husk, as opposed to petroleum-derived carbon, as a battery anode source material. The second is to replace lithium as a cathode material because of its issues with thermal instability. Sodium is an attractive alternative due to its ready availability and positive environmental impact. Thus, this project focuses on demonstrating the viability of using sodium-ion and biowaste to create batteries. Coconut husks were cleaned, dried, and then pyrolyzed in an electric furnace at ~600°C; Biochar was used as the control. The samples were then analyzed for morphology using an SEM. For testing, a hard carbon slurry, polyvinylidene difluoride binder, and carbon black were prepared. Coin cells were prepared in an inert atmosphere chamber, using a sodium metal anode, separator, electrolyte, and carbon-based electrode. Computer analysis was used to analyze the charge and cycles of the cells.

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