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Synthesis and identification of silica and activated carbon nanocomposite from rice husks for energy storage

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The rapidly growing demand for renewable energy storages, there has been growing the interest in nanomaterials from biomass waste. One of the key to improve performance of the nanomaterial depends on the structure of materials. The rice husks (RHs) are the most agricultural biomass waste found in Thailand. They are source of SiO2 and carbon nanostructure. Nano-silica (SiO2) and activated carbon (AC) can be extracted from RHs employing a simple procedure without any destruction the nanostructures, which can provide high surface area and high electrical conductivity. In this work, SiO2/AC nanocomposites were synthesized by calcination under Argon atmosphere at temperatures between 400 and 1,200 ℃. The chemical and crystal structure of SiO2/AC nanocomposites were identified by SEM, TEM, XRD and FTIR techniques, respectively. The XRD results show crystalline and amorphous phases of silica and carbon at different calcination temperature. The FTIR results show the intensity of the major chemical groups of SiO2 and the aromatic hydrocarbons peak of AC. Moreover, the results also show the relationship between carbon allotropes and calcination temperature. The electrochemical properties of SiO2/AC nanocomposites in lithium ion batteries depend on chemical groups of SiO2 and the aromatic hydrocarbons of AC.

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