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Nano-materials from Rice Husks for Lithium Ion Battery Applications

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Our research team has studied the potentials of producing nanostructured silicon and silica using rice husk as starting raw materials. We have developed several nanostructured silicon and silicon derivatives from agricultural wastes due to its large quantity, easy to process, and cheaper to be developed into nanomaterials with high economic value. Nano-silicon and its derivatives can be extracted from rice husk using our chemical and thermal processes. The purity of the silica (>91%) and the investigation crystalline phase formation using X-ray diffraction (XRD) found that the pure phase of silicon. The particle sizes of 10-20 nm and morphology particles are spherical particles can be obtained by the investigation microstructural characterization of nano-materials were carried out using Transmission electron microscopy (TEM) and scanning electron microscopy (SEM). These recovered nano-silicon exhibits high performance as Li-ion battery anodes with a reversible capacity of 1,300 $mAhg^{-1}$. We can produce high performance electrodes from nano-silicon, silicon composite with carbon, and silicon composite with silicon carbide with sizes on the nanometer scale. Nano-silica can be used as raw material in the synthesis of lithium iron silicate (Li_2FeSiO_4) cathodes for lithium ion battery as well.

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