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ABOUT THE JOURNAL

CARBON letters

Aims and Scope

Carbon Letters aims to be a comprehensive journal with complete coverage of carbon materials and carbon-rich molecules. These materials range from, but are not limited to, diamond and graphite through chars, semicokes, mesophase substances, carbon fibers, carbon nanotubes, graphenes, carbon blacks, activated carbons, pyrolytic carbons, glass-like carbons, etc. Papers on the secondary production of new carbon and composite materials from the above mentioned various carbons are within the scope of the journal. Papers on organic substances, including coals, will be considered only if the research has close relation to the resulting carbon materials. Carbon Letters also seeks to keep abreast of new developments in their specialist fields and to unite in finding alternative energy solutions to current issues such as the greenhouse effect and the depletion of the ozone layer. The renewable energy basics, energy storage and conversion, solar energy, wind energy, water energy, nuclear energy, biomass energy, hydrogen production technology, and other clean energy technologies are also within the scope of the journal. Carbon Letters invites original reports of fundamental research in all branches of the theory and practice of carbon science and technology.

In the journal, some of the covered technical areas are

Adsorption and Surface (Reactivity, Catalysts, etc.)
Clean Energy Storage (Secondary batteries, Capacitors, Fuel cells, Gas storage, Electronic / electrochemical properties, etc)
Carbon Nanomaterials (Particles, Tubes, Fibers, Coils, etc. in nano scale size)
Biomedical Carbons
Industrial Carbons (Chars, Cokes, Graphite, Flame formed carbons, etc.)
Noval Carbons (New-form carbons, Chemically modified carbons, Carbon alloys, Functional carbons, etc)
Porous Materials and Environmental Applications (Membranes, etc.)
Structural Carbons (Whiskers, Fibers, Composites, etc.)
Carbon Science (Precursor chemistry, Carbonization, Graphitization, Materials characterization, Computer simulation of carbon, etc.)
Other Products and Applications (Pyrocarbons, Diamonds, Diamond-like carbons, etc.)

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Structural and preliminary electrochemical characteristics of palm oil based carbon nanospheres as anode materials in lithium ion batteries
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Note

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Structural and preliminary electrochemical characteristics of palm oil based carbon nanospheres as anode materials in lithium ion batteries

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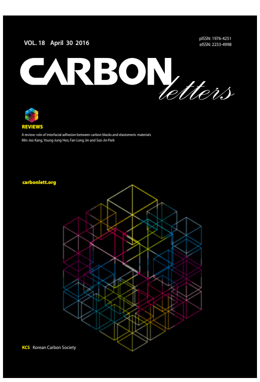

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Since the invention of the lithium-ion battery (LIB) in the early 1990s by SONY, graphite carbon has been used as the anode material because of its low cost, chemical stability, and stable electrochemical performance [1]. The limitations of graphite anodes, especially related to their small energy and power output per unit mass or volume, are retarding the development of certain high-tech industries such as hybrid electric vehicles and stationary energy storage [2]. Therefore, there is currently an intense search for new anode materials for LIBs, with high specific capacity and energy density [3,4].

In recent decades, the development of nano-carbon materials with well-defined characteristics, such as fullerenes, nanotubes, and graphene; has been a very active area of research [5]. Carbon nanospheres (CNSs) are another class of nanostructured carbon materials, and have shown good prospects for application as alternative LIB anodes [6]. CNSs possess some remarkable characteristics useful in LIB anode materials, such as high specific capacity and good rate capability. Those specific characteristics are attributed to a combination of several factors, including short diffusion paths for Li^+ ions, good porosity, and large surface area [7].

CNSs can be synthesized by various techniques and these influence the characteristics of the resulting carbon products in terms of sphere size, size distribution, crystallinity, and microstructure. The processes by which CNSs are synthesized include chemical vapor deposition [8], hydrothermal carbonization [9], laser ablation [10], and polymerization-carbonization [11].

Carbon based materials were initially made from petroleum-derived compounds. Because of the depletion of carbon deposits and very serious concerns about global climate change and environmental pollution, the use of renewable natural resources (e.g., biomass) for production of carbon materials has been intensively explored in recent years [12].

In this work, the synthesis of CNSs on the surface of activated carbon support was carried out using a thermal-assisted catalytic pyrolysis technique and utilizing palm oil as renewable and eco-friendly carbon source. Specifically, the effect of the amount of Fe-catalyst on the structural and electrochemical characteristics of the CNSs will be reported.

Commercial activated carbon (102836, Merck) has been used as a catalyst support without prior treatment. Analytical grade $Fe(NO_3)_2$ was used as catalyst. The catalyst was deposited onto the carbon support using the urea deposition method. In this method, 2 g of activated carbon was mixed with $Fe(NO_3)_2$ solution at various ratios (10%, 20%, and 30% with respect to the weight of the activated carbon). The ratio of $Fe(NO_3)_2$ to urea was set at the molar ratio of 1:3. The mixtures were shaken for 4 h at 90°C, cooled down overnight, and centrifuged at 6000 r/min for 15 min. The cake so obtained was then dried at 110°C for 24 h and then mixed with palm oil at the mass ratio of 1:3.

The CNS were synthesized by pyrolyzing mixtures of activated carbon, urea, $Fe(NO_3)_2$,