Biomass graphene derived from date seeds as an anode material for lithium-ion battery

Kazna Tassybay[1*], Nurbolat Issatayev[1], Gulnur Kalimuldina[2], Arailym Nurpeissova[3], Zhumabay Bakenov[1,3]

[1]*Department of Chemical and Materials Engineering, Nazarbayev University, Kabanbay batyr ave. 53, Nur-Sultan, RK*
[2]*Department of Mechanical and Aerospace Engineering, Nazarbayev University, Kabanbay batyr ave. 53, Nur-Sultan, RK*
[3]*National Laboratory Astana, Nazarbayev University, Kabanbay batyr ave. 53, Nur-Sultan, Kazakhstan*
*E-mail: kazna.tassybay@nu.edu.kz , **E-mail: zhumabay.bakenov@nu.edu.kz

Lithium-ion batteries (LIBs) are in great demand as energy storage systems applied in wide range of electronic devices. However, currently used commercial anodes have a limited capacity of 372 mAh g $^{-1}$. Therefore, development of novel carbon materials for high performance electrodes is of high interest. Recently, biomasses have attracted much attention as electrode materials for LIBs due to their low cost and environmental sustainability. In this research, a nitrogen-doped porous biomass graphene material was prepared from date seeds as an organic matter through carbonization and chemical activation. Dicyandiamide and potassium hydroxide were used as the sources of nitrogen and activating agent, respectively. The physio-chemical properties of the obtained graphene were characterized by X-ray diffraction, Raman spectroscopy and X-ray photoelectron spectroscopy. The electrochemical performance of the graphene as an anode material for lithium-ion battery was evaluated. The specific discharge capacity of the batteries with graphene synthesized at 300℃ carbonization and 800℃ activation temperatures was 500 mAh g $^{-1}$ after 100 cycles at 0.1 C. These results can provide a new direction in production of high performance and environmentally friendly energy storage materials from biomasses.

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