

Accepted Manuscript

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PII: S0167-577X(17)31380-0

DOI: <http://dx.doi.org/10.1016/j.matlet.2017.09.045>

Reference: MLBLUE 23159

To appear in: *Materials Letters*

Received Date: 18 July 2017

Revised Date: 30 August 2017

Accepted Date: 12 September 2017



Please cite this article as: Q. Xiong, J. Lou, Y. Zhou, S. Shi, Z. Ji, Ultrafast synthesis of $\text{Mn}_{0.8}\text{Co}_{0.2}\text{CO}_3$ /graphene composite as anode material by microwave solvothermal strategy with enhanced Li storage properties, *Materials Letters* (2017), doi: <http://dx.doi.org/10.1016/j.matlet.2017.09.045>

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Ultrafast synthesis of $\text{Mn}_{0.8}\text{Co}_{0.2}\text{CO}_3$ /graphene composite as anode material by microwave solvothermal strategy with enhanced Li storage properties

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Abstract

Carbonate is recently studied as anode material for lithium ion battery due to its relatively high capacity compared to relative oxides. In order to improve the time-efficiency of synthesis, an ultrafast solvothermal process assisted with microwave is carried out to obtain well-constructed $\text{Mn}_{0.8}\text{Co}_{0.2}\text{CO}_3$ /graphene composite as anode material for lithium ion batteries. The as-prepared $\text{Mn}_{0.8}\text{Co}_{0.2}\text{CO}_3$ /graphene composite with a graphene amount of 17.5 wt.% exhibits a morphology of cubic particles in graphene without any impurity. $\text{Mn}_{0.8}\text{Co}_{0.2}\text{CO}_3$ /graphene delivers high initial charge capacities of 1033 mAh g⁻¹. And after 120 cycles, charge/discharge capacities of 737/735 mAh g⁻¹ are maintained at 0.2 A g⁻¹. Even at 2 A g⁻¹, the composite can still deliver high charge/discharge capacities of 500/501 mAh g⁻¹. It is promising to obtain carbonate/graphene anode materials rapidly through such ultrafast solvothermal process assisted by microwave for application.

Keywords: Ultrafast synthesis; Solvothermal; Carbon materials; Composite materials; Energy storage and conversion; Lithium-ion battery.

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