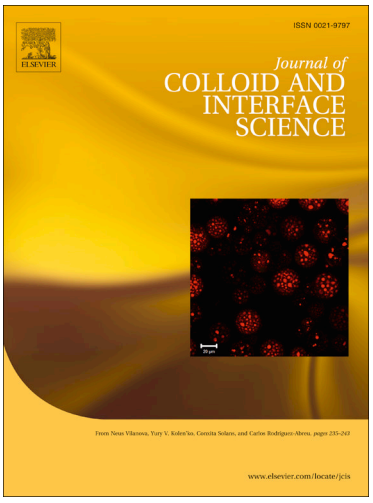

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PII: S0021-9797(18)30774-4
DOI: https://doi.org/10.1016/j.jcis.2018.07.019
Reference: YJCIS 23810

To appear in: *Journal of Colloid and Interface Science*

Received Date: 16 May 2018
Revised Date: 4 July 2018
Accepted Date: 5 July 2018

Please cite this article as: J. Jiang, K. Zhu, Y. Fang, H. Wang, K. Ye, J. Yan, G. Wang, K. Cheng, L. Zhou, D. Cao, Coralloidal Carbon-Encapsulated CoP Nanoparticles Generated on Biomass Carbon as a High-rate and Stable Electrode Material for Lithium-ion Batteries, *Journal of Colloid and Interface Science* (2018), doi: https://doi.org/10.1016/j.jcis.2018.07.019

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Abstract

Architecture of electrode materials play an important role in achieving favorable electrochemical performance via providing fast electronic transport pathway and shorten lithium ion diffusion distance. Herein, ultrafine CoP nanoparticles were successfully embedded in carbon nanorod, which were grown on the biomass-derived carbon (BC). When applied as anode materials for lithium-ion batteries, these CoP@C/BC displayed capable specific capacity, remarkable rate ability and outstanding long-term cycling performance. The capacity was governed by combination of diffusion-controlled and capacitive processes, according to quantitative kinetic analysis. The good electrochemical performance is attributed to hierarchical construction of nanosized CoP embedded in carbon nanorod and BC with high conductivity composite, which relieve the volume changing of CoP and provide large electrode/electrolyte interface. The present design of hierarchical architecture can be extended to other transition metal-based oxides, sulfide and phosphide electrode materials for high performance alkali metal ion batteries.