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PII: S1385-8947(18)31414-1
DOI: https://doi.org/10.1016/j.cej.2018.07.165
Reference: CEJ 19563

To appear in: *Chemical Engineering Journal*

Received Date: 2 May 2018
Revised Date: 3 July 2018
Accepted Date: 25 July 2018

Please cite this article as: Y. He, K. Xiang, W. Zhou, Y. Zhu, X. Chen, H. Chen, Folded-hand silicon/carbon three-dimensional networks as a binder-free advanced anode for high-performance lithium-ion batteries, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.07.165

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ABSTRACT

Folded-hand silicon/carbon (Si/C) three-dimensional (3D) networks were fabricated by chemical vapor deposition coupled with ultrasonic atomization and successfully applied for a binder-free anode in lithium-ion batteries. The microstructure, morphology and electrochemical performance for Si/C 3D networks were investigated by X-ray diffraction, scanning electron microscopy, transmission electron microscopy and galvanostatic charge-discharge tests. The repeated folded-hand units for Si/C composites are assembled into interconnected 3D networks. The folded-hand Si/C 3D networks show an outstanding charge capacity of 2277 mAh g^{-1} at 0.1 C, and still remain 2167 mAh g^{-1} after 100 cycles. They reveal an excellent rate capacity of 1848 mAh g^{-1} and capacity retention of 99% after 100 cycles at 2C,