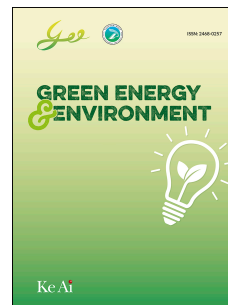


Accepted Manuscript

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PII: S2468-0257(17)30032-8

DOI: [10.1016/j.gee.2017.04.002](https://doi.org/10.1016/j.gee.2017.04.002)

Reference: GEE 65

To appear in: *Green Energy and Environment*

Received Date: 3 March 2017

Revised Date: 20 April 2017

Accepted Date: 21 April 2017

Please cite this article as: Z. Tai, Y. Liu, Q. Zhang, T. Zhou, Z. Guo, H.K. Liu, S.X. Dou, Ultra-light and Flexible Pencil-Trace Anode for High Performance Potassium-ion and Lithium-ion Batteries, *Green Energy & Environment* (2017), doi: 10.1016/j.gee.2017.04.002.

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Ultra-light and Flexible Pencil-Trace Anode for High Performance Potassium-ion and Lithium-ion Batteries

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Keywords: current-collector-free; flexible pencil-trace electrode; potassium ion battery; lithium ion battery; layer-by-layer interconnected architecture

Engineering design of battery configurations and new battery system development are alternative approaches to achieve high performance batteries. A novel flexible and ultra-light graphite anode is fabricated by simple friction drawing on filter paper with a commercial 8B pencil. Compared with the traditional anode using copper foil as current collector, this innovative current-collector-free design presents capacity improvement of over 200% by reducing the inert weight of the electrode. The as-prepared pencil-trace electrode exhibits excellent rate performance in potassium-ion batteries (KIB), significantly better than in lithium ion batteries (LIBs), with capacity retention of 66% for the KIB vs. 28% for the LIB from 0.1 to 0.5 A g⁻¹. It also shows a high reversible capacity of ~230 mAh g⁻¹ at 0.2 A g⁻¹, 75% capacity retention over 350 cycles at 0.4 A g⁻¹ and the highest rate performance (based on the total electrode weight) among graphite electrodes for K⁺ storage reported so far.

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