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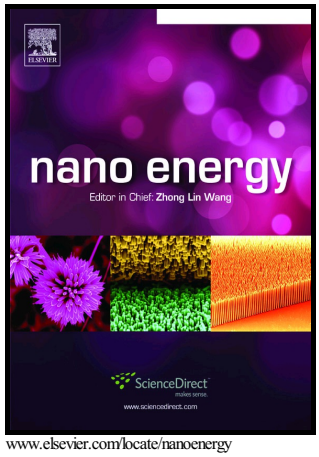

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Integrated paper electrodes derived from cotton stalks for high-performance flexible supercapacitors

Jizhang Chen[a,*], Kaili Fang[a], Qiongyu Chen[a], Junling Xu[b], Ching-Ping Wong[b,c,*]

[a] *College of Materials Science and Engineering, Nanjing Forestry University, Nanjing, China*

[b] *Department of Electronic Engineering, The Chinese University of Hong Kong, Hong Kong, China*

[c] *School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, United States*

Abstract

With the rapid development of flexible electronics, new opportunities are opening up for paper-based electrodes. Herein, an integrated paper electrode consisting of homogeneously mixed cellulose fibers, activated carbon (AC), and carbon black is fabricated using cotton stalks as the raw material. Assembled from two such electrodes, the flexible supercapacitor exhibits high energy density, high power density, and outstanding cyclability. Remarkably, the thickness and AC mass loading of the paper electrode can be easily scaled up to commercial levels (610 μm and 9.8 mg cm^{-2}), while still delivering great performances. Moreover, it is demonstrated that the replacement of AC with Ni-Co layered double hydroxide or Fe_2O_3 can result in paper-based asymmetric supercapacitor with extremely high energy density (331 μWh cm^{-2} and 10.3 mWh cm^{-3}), substantially outperforming conventional paper-based supercapacitors. The fabrication methodology of integrated paper electrodes in this report manifests great potential, offering a new vision for flexible energy storage.

***Key Words*:** Biomass, Cellulose, Paper, Flexibility, Supercapacitors.

* Corresponding author.
E-mail addresses: jizhang.chen@hotmail.com (J. Chen), cp.wong@mse.gatech.edu (C.-P. Wong)