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Research Article

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One-Dimensional Assembly of Conductive and Capacitive Metal Oxide Electrodes for High-Performance Asymmetric Supercapacitors

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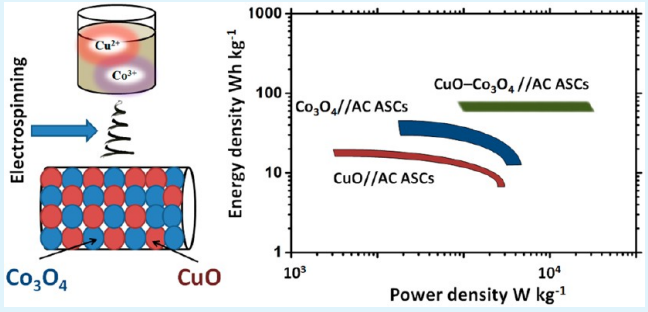
Supporting Information

ABSTRACT: A one-dimensional morphology comprising nanograins of two metal oxides, one with higher electrical conductivity (CuO) and the other with higher charge storability (Co_3O_4), is developed by electrospinning technique. The CuO−Co_3O_4 nanocomposite nanowires thus formed show high specific capacitance, high rate capability, and high cycling stability compared to their single-component nanowire counterparts when used as a supercapacitor electrode. Practical symmetric (SSCs) and asymmetric (ASCs) supercapacitors are fabricated using commercial activated carbon, CuO, Co_3O_4, and CuO−Co_3O_4 composite nanowires, and their properties are compared. A high energy density of ∼44 Wh kg^{-1} at a power density of 14 kW kg^{-1} is achieved in CuO−Co_3O_4 ASCs employing aqueous alkaline electrolytes, enabling them to store high energy at a faster rate. The current methodology of hybrid nanowires of various functional materials could be applied to extend the performance limit of diverse electrical and electrochemical devices.



KEYWORDS: *renewable energy, hybrid capacitors, energy-storage materials, electrochemical charge storage, nanocomposites, electrodes, pseudocapacitors, electrochemical double-layer capacitors*

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