Electrospun SnO_2-CuO semiconductor composite nanofibers and its electrochemical properties

Jinkiong, Ling; Jose, Rajan
[a] Faculty of Industrial Sciences and Technology, University Malaysia Pahang, Malaysia

ABSTRACT
Composite metal oxide had attracted attention across numerous fields of application due to their synergic combination of properties from their single constituents. Further modification of composite metal oxide into nanostructure, especially 1-dimensional structure was proven to further improve active surface area, carrier transport properties, etc. In this study, a n-type p-type SnO2-CuO composite nanofibers was synthesized through multi-needle electrospinning techniques. The FESEM confirmed the 1-dimensional nanostructures with diameter>100nm whereas XRD showed the coexistence of both SnO2 and CuO crystallite phases within the SnO2-CuO composite. The electrochemical properties of the synthesized samples were subsequently analyzed, concluding that SnO2-CuO composite improved the voltage range of SnO2 as well as the conductivity of the CuO nanofibers. However, from the perspective of the overall performance, the advantages of SnO2 was balanced out by the deficient of CuO, with specific capacity of 249.1F/g for SnO2-CuO, greater than CuO (104.4F/g) but lower than SnO2 (350.4F/g). Altering the ratio of Sn:Cu would be favorable to further improve the performance of the SnO2-CuO material system.

KEYWORDS
Binary metal oxide; Composite; Energy storage; N-type; P-type; Renewable technology

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