

Accepted Manuscript

Full Length Article

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PII: S0169-4332(18)31390-4

DOI: <https://doi.org/10.1016/j.apsusc.2018.05.090>

Reference: APSUSC 39366

To appear in: *Applied Surface Science*

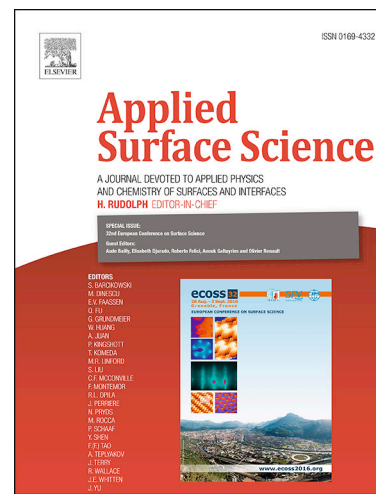
Received Date: 8 January 2018

Revised Date: 10 May 2018

Accepted Date: 12 May 2018

Please cite this article as: R.C. Ambare, P. Shinde, U.T. Nakate, B.J. Lokhande, R.S. Mane, Sprayed Bismuth Oxide Interconnected Nanoplates Supercapacitor Electrode Materials, *Applied Surface Science* (2018), doi: <https://doi.org/10.1016/j.apsusc.2018.05.090>

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Sprayed Bismuth Oxide Interconnected Nanoplates Supercapacitor Electrode Materials

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Abstract

The present article we report synthesis and electrochemical supercapacitor application of sprayed bismuth oxide (Bi_2O_3) inter-connected upright standing nano-plates *via* a simple spray pyrolysis aqueous route onto a flexible 3D Ni-foam at 623 ± 2 K. The Bi_2O_3 Ni-foam was initially characterized for the structure, morphology and phase-purity analyses and then envisaged as electrode materials in supercapacitor application. Polycrystalline, cubic crystal structure nanoplates of Bi_2O_3 nanoplates were hydrophobic in character. The cyclic voltammetry curves of Bi_2O_3 electrode, scanned at various scan rate like 5 and 1000 mV/s in 1 M Na_2SO_4 , in the potential window – 0.8 to 1.9 V *vs.* Ag/AgCl confirm mixed capacitive behavior. Using charge-discharge study, the calculated maximum values of specific energy, specific power and columbic efficiency were 702.97 Wh/kg, 334.7 kW/kg and 99.9%, respectively. Electrochemical impedance measurement scanned in the frequency range of 1 mHz – 1 MHz confirms $\sim 6 \Omega$ solution resistance and $\sim 13 \Omega$ charge transfer resistance. An excellent electrochemical stability of 92 % at 100 mV/s scan rate even after 5000 redox cycles demonstrates an industrial potential of Bi_2O_3 electrode materials.

Keywords: Spray Pyrolysis; Bismuth oxide; Nanoplates; Electrochemical supercapacitors.

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Introduction

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