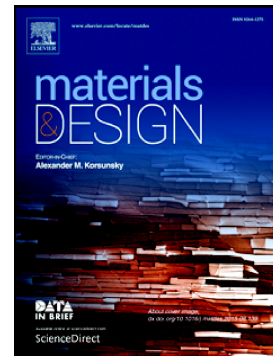


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## Continuous nanobelts of nickel oxide–cobalt oxide hybrid with improved capacitive charge storage properties

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### Abstract

This paper reports the synthesis of continuous nanobelts, whose thickness is less than half of its pore diameter, of a material hybrid composing of nanograins of nickel oxide and cobalt oxide by electrospinning technique and their capacitive charge storage properties. While the constituent binary metal oxides (NiO and Co<sub>3</sub>O<sub>4</sub>) formed solid cylindrical nanofibers the hybrid and a stoichiometric compound in the Ni-Co-O system, i.e., spinel-type NiCo<sub>2</sub>O<sub>4</sub>, formed as thin nanobelts due to the magnetic interaction between nickel and cobalt ions. The nanobelts showed six-fold larger surface area, wider pores, and impressive charge storage capabilities compared to the cylindrical fibres. The hybrid nanobelts showed high specific capacitance ( $C_S \sim 1250 \text{ F g}^{-1}$  at  $10 \text{ A g}^{-1}$  in  $6 \text{ M KOH}$ ) with high capacity retention, which is appreciably larger than found for the stoichiometric compound ( $\sim 970 \text{ F g}^{-1}$  at  $10 \text{ A g}^{-1}$ ). It is shown that the hybrid nanobelts have lower internal resistance ( $1.3 \text{ } \Omega$ ), higher diffusion coefficient ( $4.6 \times 10^{-13} \text{ cm}^2 \text{ s}^{-1}$ ) and smaller relaxation time ( $0.03 \text{ s}$ ) than the benchmark materials studied here.

Keywords: Nanocomposites; Hybrid metal oxides; Energy storage devices; Renewable energy; Electrochemical charge storage

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