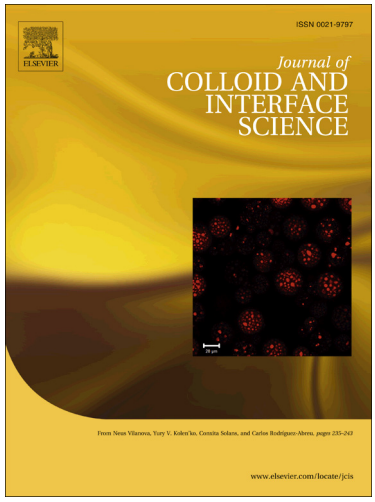


# Charge storage, electrocatalytic and sensing activities of nest-like nanostructured $Co_3O_4$

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PII: S0021-9797(16)30763-9
DOI: http://dx.doi.org/10.1016/j.jcis.2016.10.011
Reference: YJCIS 21644

To appear in: *Journal of Colloid and Interface Science*

Received Date: 24 August 2016
Revised Date: 3 October 2016
Accepted Date: 4 October 2016

Please cite this article as: G. Rajeshkhanna, E. Umeshbabu, G. Ranga Rao, Charge storage, electrocatalytic and sensing activities of nest-like nanostructured $Co_3O_4$, *Journal of Colloid and Interface Science* (2016), doi: http://dx.doi.org/10.1016/j.jcis.2016.10.011

# Charge storage, electrocatalytic and sensing activities of nest-like nanostructured $Co_3O_4$

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**Abstract**

We synthesized nanostructured $Co_3O_4$ samples using anionic (SDS), cationic (CTAB) and nonionic (TritonX-100) surfactant molecules in hydrothermal conditions and subsequent calcination. This approach facilitates the synthesis of porous $Co_3O_4$ material with bundle-like-sheet, nest-like and flake-like morphologies with specific surface areas in the range of 50 to 77 $m^2$ $g^{-1}$. Among these materials, the nest-like nanostructured $Co_3O_4$ material has unique pore architecture, larger pore volume, low solution and charge transfer resistance, and found to be an active material for charge storage, electrocatalytic and sensing applications. The specific capacitance value of the nest-like $Co_3O_4$ is 404 F $g^{-1}$ at a current density of 2 A $g^{-1}$ with 80% specific capacitance retention. The electrocatalytic oxidation of methanol occurs at lower onset potential on this material with good electrochemical stability. It has good sensing ability for glucose with high sensitivity of 929 µA $cm^{-2}$ $mM^{-1}$, fast response time of ~0.5 s and detection limit as low as ~1 µM. These results show that the nest-like nanostructured $Co_3O_4$ material is a versatile candidate for various applications.

*Keywords:* $Co_3O_4$; Supercapacitor; Electrooxidation; Glucose sensor

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