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Earth-abundant nanostructures for energy storage applications

A.Fischetti*, D. Russo*, G. Mineo, G. Di Mari, E. Bruno, M. G. Grimaldi, S. Mirabella, G. Franzò, V. Strano, M. C. Spadaro

Dipartimento di Fisica e Astronomia "Ettore Majorana", Università degli Studi di Catania, via S. Sofia 64, Catania 95123, Italia.Consiglio Nazionale delle Ricerche, Istituto per la Microelettronica e i Microsistemi (CNR- IMM), sede di Catania-Università, Via S. Sofia 64, 95123 Catania, Italia.

**These authors contributed equally to this work.*

e-mail: vincenzina.strano@ct.infn.it and mariachiara.spadaro@dfa.unict.it

An efficient management of energy, necessary to meet the ever-increasing global demand, involves the development of new approaches for sustainable energy storage. Many technologies have been explored for storing energy; above others, electrochemical-based energy storages device based on engineered nanostructures demonstrated to be a promising solution. Indeed, nanostructures characterized by very high surface area guarantee high specific capacitance. Furthermore, if we consider nanostructures based on transition metal oxides (TMOs) the excellent specific capacitance can be combined with their chemical and physical properties as well as low fabrication costs. Above all, zinc oxide (ZnO) is highly promising in this direction thanks to its characteristics: it is non-toxic, earth abundant and can be prepared via low-cost synthesis routes. In this poster presentation we show our latest results onto the green-synthesis of ZnO nanostructures with desired shapes obtained by simply controlling the main preparation parameters via high-yield and inexpensive solution-based technique. The as-prepared nanostructures are then investigated with scanning and transmission electron microscopies (SEM and TEM). Electrochemical characterization allows to evidence the relationship between the ZnO morphology, composition and structure with their performance as supercapacitor, being able to address the specific features involved in the device performance and optimize the synthesis route to obtain highly performing supercapacitors.

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