ZnO nanostructures for enhanced electrochemical energy storage

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Many strategies are proposed to reach the ambitious goal of effective and sustainable energy storage [1]. Among others, the technologies based on electrochemical mechanisms, as batteries and supercapacitors, find large application also in portable energy storage systems [2]. Transition metal oxides (TMOs) nanostructures represent an affordable option as electrodes in this kind of electrochemical devices thanks to their chemo-physical properties and low fabrication cost [3]. In particular, zinc oxide (ZnO) is non-toxic, earth-abundant and can be prepared via low-cost synthesis routes [4]. Here we present ZnO nanostructures with different shapes, obtained via high-yield and inexpensive solution based technique by varying the synthetic parameters [4,5]. The nanostructured ZnO is characterized by scanning and transmission electron microscopies (SEM and TEM), photoluminescence (PL) spectroscopy, X-ray diffraction (XRD)analysis. Electrochemical characterization allows to evidence the relationship between the ZnO structures and their performance as supercapacitor [5]. The synergy of ZnO with other TMOs nanostructures, as well as with carbon-based materials, is evaluated as approach to enhance the storage capability of ZnO.

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