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5-1

Hybrid material based on polyoxometalate deposited on electrochemically exfoliated graphene

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In this paper we demonstrated successful synthesis of Keggin-type POM (MoPA)/exfoliated graphene (EG) nanocomposite. By different characterization techniques (micro-Raman spectroscopy, Fourier transform infrared spectroscopy, atomic force microscopy, scanning electron microscopy and cyclic voltammetry) we investigated structural and morphological properties of MoPA/exfoliated nanocomposite. Microscopy analysis showed the presence of MoPA clusters on the surface and edges of EG sheets. The strong electrostatic interaction between MoPA and EG sheets was confirmed by Raman, FTIR spectroscopy and cyclic voltammetry. Cyclic voltammetry has shown that capacitive characteristics of the obtained material may be improved by increased quantity of graphene.

5-2

Tailoring self-ordering TiO_2 nanotube arrays by oxidative anodization

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Having in mind that anodic oxidation method can be used for tailoring desired structure and morphology of TiO_2, herein the synthesis of self-ordered TiO_2 nanotubes via electrochemical anodization of high purity Ti foil is reported. The influence of synthesis parameters such as oxidative voltage, different electrolyte, annealing temperature and annealing atmosphere were explored and correlate with obtained TiO_2 nanotube arrays. The results show that applied potential is the main factor that controls the diameter of the nanotubes, while annealing temperature influence on crystal type and morphology is related to different contents of electrolyte. Investigated method gives opportunity to enhanced performance of TiO2 nanotubes, providing many applications in different field.