Ionic Liquid Functionalized MoO_3 Nanohybrids for an Application in Energy Storage

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In this research, we report the synthesis of ionic liquid (IL)-functionalized crystalline molybdenum oxide nanohybrid and its application in supercapacitors. 1-Hexyl-3-methyl immadazolium chloride (HMImCl) ILs were used to induce the nanostructure of hybrids during a sol-gel process as well as to functionalize the resultant materials. Furthermore, the hybrids were topochemically transformed into orthorhombic α-MoO3. The structure and chemistry of hybrid material was comprehensively characterized by x-ray diffraction (XRD), transmission electron microscope (TEM), thermo gravimetric analysis (TGA) and spectroscopic techniques. Cyclic voltametry (CV), galvanostatic charge discharge (GCD) and impedance spectroscopy (IS) were used to evaluate the supercapacitor performances of hybrids. In order to demonstrate the synergistic effect of hybrids, their specific capacitances were compared to those of non-functionalized molybdenum oxide and IL removed samples. The synthetic strategy delineated herein would provide a new approach to induce nanostructures through IL-templated process and to directly functionalize hybrids for high performance energy storage devices.