Proc. of the Intl. Conf. on Nanotechnology for Better Living, 2016
Editors K. K. Kar, A. Shah and R. Sharma
Vol. 3, No. 1, p. 147
doi:10.3850/978-981-09-7519-7nbl16-rps-147

$TiO_2 – V_2O_5$ nanocomposites for energy storage application

Apurba Ray, Atanu Roy, Priyabrata Sadhukhan and Sachindranath Das*

Dept. of Instrumentation Science, Jadavpur University, Jadavpur, Kolkata-700032, India.
*Email: sachindas15@gmail.com

Supercapacitor, the most promising energy storage system, can store substantially more energy than a conventional battery. According to the charge storage mechanism, supercapacitors can be classified into two categories. The first category is electrical double-layer capacitors (EDLCs) and pseudocapacitors (or redox-capacitors).High cycle life (500,000 cycles) and good stability make supercapacitors more useful for the modern generation. Among various pseudocapacitor electrode materials, hydrous RuO_2 exhibits the most promising performance to date. However, the high cost of RuO_2 has limited its commercial attractiveness for supercapacitor applications. Therefore, there has been an extensive interest in developing alternative pseudocapacitor electrode materials, such as MnO_2, Co_3O_4, NiO , V_2O_5, TiO_2-V_2O_5 etc.[1].

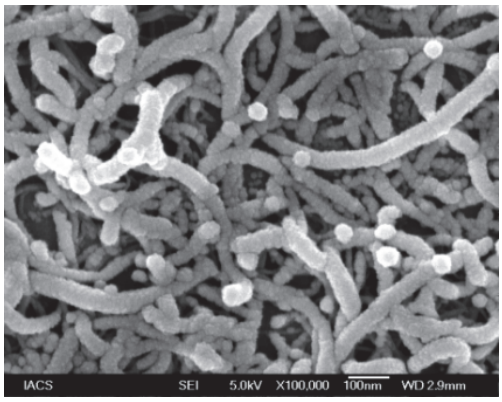

Figure 1: The FESEM images of TiO_2-V_2O_5films

Among all the metal-oxides, TiO_2-V_2O_5, particularly with proper molar ratios of Ti/V, has the advantage of moderate conductivity, low cost and can be easily synthesized. Herein, we have prepared the optimized TiO_2-V_2O_5 nanocomposites with different Ti/V molar ratios (10:10, 10:15 and 10:20). Moreover, the effect of the crystallinity and microstructure of TiO_2-V_2O_5 composites were examined with the help of XRD and FESEM followed by an insight into the cycling performance of TiO_2-V_2O_5 electrode for supercapacitor electrode materials. The Sp. Capacitance The cyclic voltammetry curve of TiO_2-V_2O_5 composite with molar ratio of Ti:V= 10:20 giving Sp. Capacitance value of 50 F/gm in 1M KCl electrolyte.

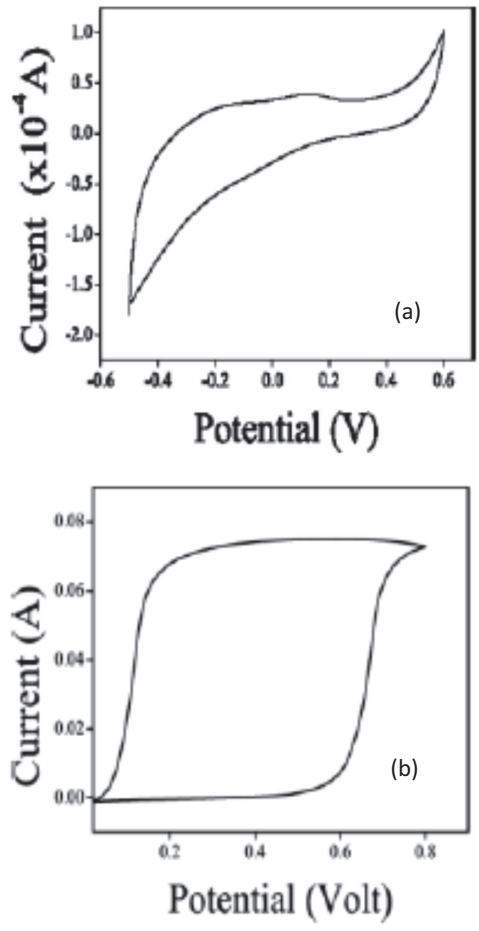

Figure 2: The CV images of TiO_2-V_2O_5 films obtained from molar ratioTi:V=10:20 using (a) 1MNaOH and (b) 1M KCl solution

Reference

1. C.D. Lokhande , D.P. Dubal , Oh-Shim Joo, CurrentApplied Physics **11** (2011) 255-270