World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:9, No:05, 2015

Thermal Reduction of Perfect Well Identified Hexagonal Graphene Oxide Nano-Sheets for Super-Capacitor Applications

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Abstract : A novel well identified hexagonal graphene oxide (GO) nano-sheets were synthesized using modified Hummer method. Low temperature thermal reduction at 350°C in air ambient was performed. After thermal reduction, typical few layers of thermal reduced GO (TRGO) with dimension of few hundreds nanometers were observed using high resolution transmission electron microscopy (HRTEM). GO has a lot of structure models due to variation of the preparation process. Determining the atomic structure of GO is essential for a better understanding of its fundamental properties and for realization of the future technological applications. Structural characterization was identified by x-ray diffraction (XRD), Fourier transform infra-red spectroscopy (FTIR) measurements. A comparison between exper- imental and theoretical IR spectrum were done to confirm the match between experimentally and theoretically proposed GO structure. Partial overlap of the experimental IR spectrum with the theoretical IR was confirmed. The electrochemical properties of TRGO nano-sheets as electrode materials for supercapacitors were investigated by cyclic voltammetry and electrochemical impedance spectroscopy (EIS) measurements. An enhancement in supercapacitance after reduction was confirmed and the area of the CV curve for the TRGO electrode is larger than those for the GO electrode indicating higher specific capacitance which is promising in super-capacitor applications

Keywords : hexagonal graphene oxide, thermal reduction, cyclic voltammetry
Conference Title : ICMSCMP 2015 : International Conference on Material Science and Condensed Matter Physics
Conference Location : Berlin, Germany
Conference Dates : May 21-22, 2015