

Preparation and characterization of the reduced graphene oxide obtained from thermal reduction

J.C.S. Filho^{1*}, E.P. Soares¹, H. Takiishi¹, R.H.L Garcia², S.K. Sakata³

¹ Science and Technology Centre in Materials, Institute of Nuclear Energy Research, SP – Brazil.

² Nuclear Fuel Centre, Institute of Nuclear Energy Research, SP – Brazil.

³ Technology Centre in Radiations, Institute of Nuclear Energy Research, SP – Brazil.

#Corresponding author: jorgecsilvaf@gmail.com, takiishi@ipen.br

Abstract:

Reduced graphene oxide (rGO) is used to produce nanocomposites with excellent electronic properties. To perform a reduction can be used some processes as thermal, chemical or electrochemical. In this work, the GO was synthesized from the modified Hummer method and the thermal reduction of GO was made to produce rGO. The experiments were performed by varying the heat treatment time (30, 20 and 15 minutes) and temperature (473, 423, 393 K) in (N₂) atmosphere at a pressure of 10 kPa. The results of the thermogravimetric analysis curves of GO and rGO showed that there were two major peaks of weight loss, the first loss of weight was attributed to loss of water and adsorbed gases and the second was attributed to the decomposition of functional groups that have oxygen. The total loss was 50% by mass and the X-ray diffraction demonstrated the disappearance of the GO diffraction peak when the rGO label showed a peak of lower intensity and wider at 25° and the distance between two layers is an important parameter to evaluate the structure of the GO that in this case the spacing is $d = 0.38$ nm with 2-3 crystalline layers and 8-11 crystallite size. The results demonstrate that the sample treated at 423 K showed a better result in the reduction when compared to the sample treated at 473 K.