Spectroscopic Characterization of Graphene Synthesized by Electrolysis in Molten Electrolytes

Aleksandar Dimitrov[1], Abdulakim Ademi[2]Anita Grozdanov[1], Beti Andonovic[1],Gennaro Gentile[3], Maurizio Avella[3] and Perica Paunović[1]

1-Faculty of Technology and Metallurgy, University "Sts. Cyril and Methodius"
RugerBošković Str., 16, 1000 Skopje
2- Ministry of Environment and Physical Planning, 1000 Skopje,
3-Institute for Chemistry and Technology of Polymers, ICTP-CNR, FabricatoOlliveti, Napoli

aco@tmf.ukim.edu.mk

Abstract

Production of graphene in semi industrial scale is of great importance for its industrial applications and industrial development in general.In this study, our main goal was producing larger amounts of graphene, by electrolysis in molten electrolytes, in the laboratory conditions as a first step towards semi-industrial production.The obtained results are promising.

Here we present the results obtained from the physical characterization of applying Raman spectroscopy, XRD, Zeta and UV spectroscopy on graphene produced by electrolysis into molten salts using non stationary current regime.

Raman spectroscopy was useful for determining of the number of the layers of the graphene. The Raman spectra, D, G and 2D bend, and ratio between it show that the produced graphene has high oriented structure, and thickness of several layers (1-2 nm). Furthermore, XRD results show that dominant structure is few layered, and the average value for number of graphene layers is about 5. UV absorption spectroscopy was used to characterize grapheme/SDS suspensions since they can be related with particle size. A maximum of all spectra was obtained at 270 nm, corresponding □□□□ transitions of aromatic C-C bonds, and a shoulder at about 350 nm which can be attributed to □□ transitions of C=O bonds. Zeta measurements of the grapheme samples have confirmed that the surface chare was negative.

Key words: Graphene, Molten salts, Graphite, Electrolysis, Raman, XRD, ZP