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Graphene Preparation by Electrochemical Exfoliation of Graphite in Presence of Carboxylate Ions

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Electrochemical methods allow to obtain graphene materials (GM) with controlled properties in an environmentally-friendly conditions. The aim of the work was to develop a method for graphene preparation by exfoliation of graphite in aqueous electrolytes based on sodium sulphate with the addition of various salts of carboxylic acids and to study the influence of exfoliation conditions on the structure of resulting GM.

We have shown that the use of pulsed electrolysis mode (+3 V vs. Ag / AgCl, 30 s; $-1 \div -3$ V, 30 s) allowed to obtain GM directly from graphite.

By means of transition and scanning electron microscopy, atomic force microscopy, UV-vis, FTIR and Raman spectroscopy it was shown that GM, obtained in such way, mainly consist of multilayer (up to 10 layers) packages of partially oxidized graphene. It was shown that variation of electrolyte composition made it possible to vary oxidation states of GM.