The first eleven days from the life of multilayer graphene oxide film: Dynamic changes in functionalities on the surface at room temperature

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Abstract

Observation of oscillatory-like reduction/oxidation reactions on the surface of fresh prepared multilayer graphene oxide (GO) film at room temperature is reported. We present study of fresh prepared GO film using X-ray photoelectron spectroscopy at room temperature. Experiments reveal red/ox reactions on the surface of graphene oxide film within eleven days of experiment. Two basic models described behavior are proposed. The first model is based on the simplest analysis of kinetic of functional group concentrations, full width at half maximum and charging shifts. It evidences that diffusion of chemically bonded hydrogen and oxygen from depth layer up to the surface makes the main contribution in the kinetic. In the frames of this model, it has been shown that it is possible to describe the experimental results using the modified model proposed by S. Kim and co-authors [1] with adding hydrogen and oxygen contained functionality flows [2].

The second model suggests chemical reactions on the edges of GO inducing nonlinear chemical processes in the bulk of material. Such kind of processes are realized in some catalytic reactions with Platinum [3].

We have estimated rate constant of reactions and allocate region of equation parameters which is satisfied to experimental data.

References

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Figures