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Functionalization of Graphene with Metal Particles by Thermal Methods

Prikhodko, N[1,2], Temirgaliyeva, T[1,3], Rakhimzhan, N[1], Lesbayev, B[1,3], Nazhipkyzy, M[1,3], Smagulova, G[1,3], Mansurov, Z[1,3]

[1] *Institute of Combustion Problems, Almaty, Kazakhstan*
[2] Almaty Univer*sity of Energetics and Communications, Almaty, Kazakhstan*
[3] Al-*Farabi Kazakh National University, Almaty, Kazakhstan*

e-mail: nik99951@mail.ru

For the synthesis of graphene with surface characteristics required for each specific application (for example, having a high affinity for the polymer matrix nanocomposites and good biocompatibility in sensor) is hold modification of graphene. The term "modification" means the graphene coating layers of organic and inorganic substances, or decorating the surface of graphene nanoparticles of different nature. The functionalization of carbon nanomaterials is an essential manipulation in creating materials with improved surface and bulk properties. This allows us to solve a number of pressing problems in materials science industries, electrochemistry and catalysis by creating multifunctional nanostructures consisting of graphene and nano-sized components with desired electronic and catalytic properties. There are two basic approaches to change graphene surface to impart desirable properties: covalent attachment of functional groups; non-covalent chemical compounds graphene surface by means of van der Waals, electrostatic, or p-electron interactions.
In this paper was presented the results for obtaining functionalized graphene samples by thermal treatment at temperatures of decomposition of inorganic salts containing metals. The morphological and structural properties of graphene samples functionalized metallic particles of Fe, La, Ni were investigated. Structure and morphological properties of graphene, functionalized by metal particles were analyzed by the scanning electron microscope (Quanta 3D 200i Dualsystem, FEI), on Raman spectrometer (NTEGRA Spectra Raman, λ = 473 nm). The elemental composition was determined at the energy-dispersive x-ray spectroscopy (EDAX). X-ray analysis on the device "Focus M4" was held for the qualitative and quantitative analysis of the graphene samples with metal particles. Established that graphene samples were functionalized with metal particles Fe, La, Ni (35, 77, 50%) which are mainly adsorbed at the edges of the graphene. It was shown that during heat treatment formed a stable composition containing the graphene on the surface of the metal particles.