

Nanostructured surfaces

Oxygen-plasma treatment of reduced graphene oxide for enhanced adsorption properties

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Reduced graphene oxide (RGO) is an interesting form of carbon, a derivative of graphene [1]. It is widely produced using graphene oxide (GO) -that are oxygenated layers of graphene- as a precursor. GO possesses oxygen functionalities such as carboxyl, carbonyl, epoxy or hydroxyl which make it hydrophilic but at the same time – electrically insulating. After reduction most of the functionalities are removed making RGO hydrophobic and electrically conducting. However, for many applications, a good dispersion of RGO in aqueous solutions is needed. Therefore a proper functionalization of RGO is a prerequisite. Recently, it was found out that oxygen-plasma treatment can successfully enhanced surface properties of carbon materials by introducing oxygen functionalities in an eco-friendly and simple manner [2]. Good electrical conductivity and high specific surface area along with oxygenated surface groups are desirable properties of synthesized RGO which open doors to wide variety of practical applications.

The aim of our work was to functionalize reduced graphene oxide surface using low-pressure oxygen plasma system with different parameters such as treatment time and power. Next, we thoroughly characterized the properties of RGO-Ox using microscopic and spectroscopic methods e.g. SEM, FTIR, XPS, DLS, UV-vis, Raman spectroscopy. The behavior of RGO-Ox in water and NMP was evaluated. Their practical application as adsorbents of different species such as metal ions (Hg(II)), Au nanoparticles or biomolecules e.g. enzymes was studied.

1. *Chae et al.* Enhancing surface functionality of reduced graphene oxide biosensors by oxygen plasma treatment for Alzheimer's disease diagnosis// *Biosens.Bioelectron.*-2017.-**92**.-P. 610–617.
2. *Trulli M., Sardella E.* Towards highly stable aqueous dispersions of multi-walled carbon nanotubes: the effect of oxygen plasma functionalization.// *J Coll Int Sci.*- 2017.-**491**.-P.255-264.