Production of Reduced Graphene Oxide for potential industrial graphene nanocomposite manufacture

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Carbon nanostructures possess the unique properties, such as low density, high conductivity, high chemical, thermal and mechanical stability, because of which an interest towards them is constantly increasing. These materials can be used for producing diverse novel materials with perfect optical, electric, mechanical and magnetic properties.

Graphene has a great attention in the recent research innovations mainly due to its unique properties, which is composed of one-atom thick sheet of hexagonally arrayed sp^2 carbon atoms [1]. The synthesis of perfect graphene is complicated process that is why pure graphene is very expensive. Therefore, graphene is often replaced by graphene oxide or reduced graphene oxide. The work focuses on a method of synthesis of reduced graphene oxide granules, which can use as nanofiller in polymer matrix. It is known that polymer nanocomposites reinforced with graphene nanofillers have better mechanical, thermal and electrical properties than pure polymer materials [2]. According to the aim, some corrugated spherical structures/granules of reduced graphene oxide were produced by a dispersion/drying method. The reduced graphene oxide suspension produced by an improved Hummers's method (figure 1), was mixed on a magnetic stirring and delivered by a peristaltic pump to the granulation zone at a speed 10-20 ml/min. The granulation zone temperature is kept within 40-150˚C. The suspension was dispersed by compressed air up to 3 atmospheres. The produced granules were accumulated in a receiver, and for the purpose of final removal of the solvent was additionally dried in the vacuum oven. The engineered reduced Graphene oxide were analyzed and the materials identification and structural-morphological characterized by XRD, TGA, UV, Raman and SEM.

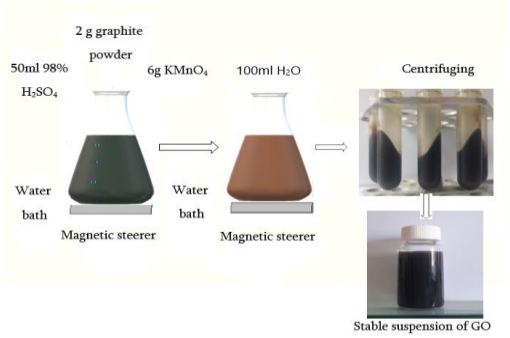

Fig. 1. Ilustration of the preparation of GO

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