PREPARATION OF GRAPHENE NANO-SHEETS UNDER OPERATION OF HIGH POWERED CAVITATION FIELD.

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Abstract

Graphene has a planar structure network of interconnected carbon atoms arranged in the shape of hexagons, similar to the honeycomb. It forms the foundation of all other carbon structures. Graphite, we can imagine as many layers of graphene laying on the each other, carbon nanotube as a rolled graphene and fullerene as a graphene crumpled into a ball the size of nanometers. Graphene sheets (or graphene layer) has a different physical properties in connection with the operation angle of physical quantities. These differences may be crucial in many cases.

Graphene plates (nano-sheets) are prepared as a solid phase of the water-based colloidal system. Mined natural graphite serves as the precursor, it is adjusted to increase its purity (chemical separation of trace amounts of impurity elements). Individual graphene plates were prepared (delaminated, exfoliated) by acting of the energies converted or initiated by the action of the high powered field of cavitation. High powered cavitation field is initiated and maintained by the system of power ultrasound generator and emitter, as well as maintaining the physical variables (temperature, partial pressure) in accordance with the conditions required for the formation of cavitation in such a type of colloidal solution. There were used anionic and cationic surfactant in the water-based colloidal system (cetyl ammonium trimethyl bromide (CTAB), sodium dodecyl benzene sulfonate (SDBS)) to prevent re-aggregation of graphene platelets. Characterization of shape and size of the resulting particles was performed by using of the laser scattering, high resolution electronic microscope (HRTEM) and electron diffraction.

Quantity of graphene platelets prepared by the method described above is directly dependent on the size and power of the delaminating apparatus. Volumes are very flexible and can move in the range of 20 l to dozens hl of 0.02% colloidal solution of one apparatus per day.

Keywords: graphene, cavitation, nano-sheets