Annexure I

CARBON NONOMATERIALS- RECENT ADVANCES AND FUNCTIONAL APPLICATIONS

In recent years nanotechnology has becomes one of the most important and exciting forefront fields in Chemistry, Physics, Engineering and Biology. It shows great promise for providing us in the near future with many breakthroughs that will change the direction of technological advances in a wide range of applications. Nanotechnology is based on the recognition that particles less than the size of 100 nm impart to nanostructures built from them new properties and behavior. This happens because particles, which are smaller than characteristic lengths associated with particular phenomena often, display new chemistry, leading to new behavior that depends on the size. For example, the electronic structure, conductivity, reactivity and mechanical properties have been observed to change when particles become smaller than a critical size.

Carbon nanotubes (CNT) are a class of nanomaterials that consist of a two-dimensional hexagonal lattice of carbon atoms, bent and joined in one direction so as to form a hollow cylinder. Carbon nanotubes are one of the allotropes of carbon, specifically a class of fullerenes, intermediate between the buckyballs (closed shells) and graphene (flat sheets). Graphene is one atom thick 2D layer of carbon atoms with sp^2 hybridization that are connected in a hexagonal lattice structure. Single layer graphene has extraordinary properties which include; ultimate tensile strength of 130 GPa, surface area of 2600 m^2/g and thermal conductivity between 2000-4000 $Wm^{-1}K^{-1}$. Carbon nanomaterials, with their unique structure and electronic configuration, offer exciting properties, making them suitable for applications in electronics, energy generation and storage, optical devices, sensors, healthcare and structural components.

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