



Contribution ID: 70

Type: not specified

## Graphene: The Wonder 2D-material of the 21st century

*Friday 29 June 2018 08:55 (25 minutes)*

New materials have always added to new technology and subsequently new society. The simplest example can be going to history where we can see the transitions from Stone Age which developed into Bronze and then Iron Age. Each age is levelled by the material, bearing the new technology and new society. The present age is levelled by the Silicon material and is known as Silicon age. Now question is –what will be the next age? Scientists assume that age may be the CARBON or GRAPHENE age because the carbon/graphene is the substitute of silicon material. Graphene is a one-atom-thick planar sheet of sp<sup>2</sup>-bonded carbon atoms that are densely packed in a honeycomb crystal lattice that can be viewed as an atomic-scale chicken wire made of carbon atoms and their bonds. It is the world's first two dimensional (2D) material isolated from graphite in 2004 by two physicists Andre Gem and Konstantin Novoselov who received the novel prize on physics in 2010. Graphene, the “wonder material”, is made of a single atom thick carbon atom layer in a honeycomb-like hexagonal lattice and is the thinnest, strongest and hardest material available. Graphene is strongest, lightest, thinnest and smallest material in the world. The last few years have seen extensive research into the properties and applications of graphene, and the material has been suggested as being the potential replacement for silicon in many electronics applications. It is highly stretchable, transparent and impermeable and useful in different device applications in our day to day life. Graphene has several useful properties that include high mechanical strength, very high electron mobility, and superior thermal conductivity. Graphene could be used to create electronic components which are transparent and flexible, creating a new paradigm in electronic product design. Graphene is flexible, transparent electronics and closer to reality with the creation of graphene-based electrodes.

In conclusion, graphene is a promising material for new types of system, circuits and devices where several functionalities can be combined into a single material. Presently, highly critical issues with the extensive use of graphene in electronics are related to manufacturing. Although growth on copper surfaces has made bulk manufacture of large area graphene layers possible, there are a number of technical challenges to be overcome both in terms of cost and quality before the first consumer products using graphene are actually commercialized.

In this present talk, I will present the process of extraction of graphene, its different properties and various applications. In addition magnetic properties of graphene and graphene oxide will be discussed for the future spintronic applications.

**Presenter:** Prof. SEKHAR, Chandra Ray (UNISA)

**Session Classification:** Material Physics