

## **Graphene: Status and Prospects**

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Graphene – a free-standing atomic plane of graphite – has turned out to be a wonder material. It has already attracted many superlatives to its name. It is of course the thinnest material in the universe and arguably the strongest one ever measured. Its charge carriers exhibit the highest known intrinsic mobility, have zero effective mass and can travel micron distances without scattering at room temperature. Graphene can sustain current densities million times higher than that of copper, shows record thermal conductivity and stiffness, is impermeable to gases and reconciles such conflicting qualities as brittleness and ductility. Electron transport in graphene and its bilayer is described by massless and massive Dirac-like equations, respectively (rather than the standard Schrodinger equation), which allows the investigation of relativistic quantum phenomena in a bench-top experiment.

This will be a general talk for non-specialists introducing graphene and its fascinating properties [1]. For illustration, I will try using the results obtained by our team in Manchester during the last year or two. The new results include electron transport at the vicinity of the Dirac point in many-million-mobility devices, properties of the first stoichiometric derivative (fluorographene) and evidence for magnetic edges.

[1] A. K. Geim, *Science* 324, 1530 (2009). A. K. Geim, K. S. Novoselov, *Nature Mater.* 6, 183 (2007).