

GRAPHENE NANOELECTRONICS

Erik Dujardin
CEMES-CNRS (France)

Although carbon-based materials such as fullerenes and carbon nanotubes have been key actors in the recent developments of molecular superconductivity and nanoelectronics, a much simpler carbon allotrope form, graphene, drew very little attention until recently. Graphene is a single sheet of carbon atoms organized in a honeycomb lattice that constitute the elementary planes of crystalline graphite. Graphene had been proposed in the mid 1990s as a potential candidate able to bridge the mesoscopic and the molecular world in electronic devices.[1] We will show how graphene-based electronics has matured from the first demonstration of quasi-ballistic transport in thin graphite [2] to the recent reports on mesoscopic transport in single-sheet graphene, half-interger quantum Hall effect,...[3-5] The recent progress in preparing graphene in monolayers or few layers samples will be presented. The talk will conclude with some considerations on the assets of grephene beyond mesoscopic physics towards atomic-scale electronics.

References

- [1] T. W. Ebbesen, H. Hiura, *Adv. Mater*, 1995, 367, 148.
- [2] E. Dujardin et al., *APL*, 2001, 79, 2474
- [3] K.S. Novoselov et al., *Nature*, 2005, 438, 197
- [4] Y. Zhang, YW Tan, HL Stormer, P. Kim, *Nature*, 2005, 438, 201
- [5] C. Berger et al., *Science* 312, 1191 (2006)