



# Carbon – Science and Technology

ISSN 0974 – 0546

<http://www.applied-science-innovations.com>

## News and Views

Received : 14/11/2008, Accepted : 14/11/2008

### Graphane : New Member of Carbon Family

**Prakash R. Somani**

Applied Science Innovations Private Limited, Vijaynagar, Building No 3, 4th Floor, B-14, Dhayari, Sinhgad Road, Pune 411041, Maharashtra, India.

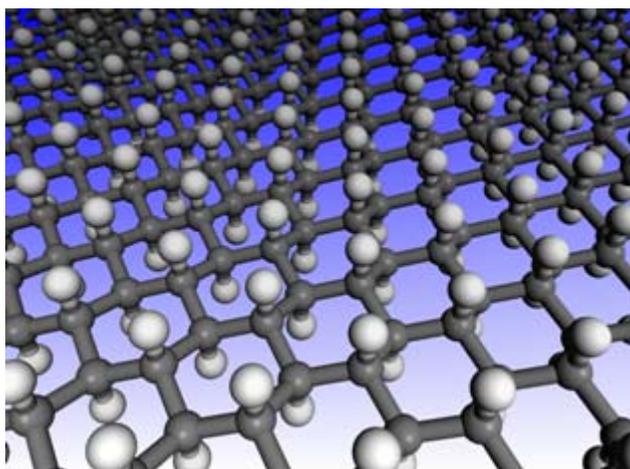


Figure (1) : Schematic of the structure of Graphane in the chair conformation. Carbon atoms are shown as gray and hydrogen atoms are white. Figure displays hexagonal network with carbon in the  $sp^3$  hybridization. Reproduced with permission from Prof. J. O. Sofo.

Graphane (an extended two dimensional fully saturated hydrocarbon derived from a single graphene sheet with formula  $CH$ ) is predicted recently by Prof. J. O. Sofo et al [1] working at Pennsylvania State University, USA based on first-principles total energy calculations. All the carbon atoms in Graphane are in  $sp^3$  hybridization and form a hexagonal network [Figure (1)]. Hydrogen atoms are bonded to carbon [ $C : H = 1$ ] on both sides of the plane in an alternating manner. Known hydrocarbons are molecules that consist of carbon backbone (linear chain, ring or a combination) with hydrogen atoms attached. Graphane is two dimensional covalently bonded hydrocarbon. Fully dehydrogenated form of Graphane is 'Graphene'. Graphane is predicted to be stable with a binding energy comparable to other hydrocarbons such as benzene, cyclohexane, and polyethylene. Graphane is predicted to be a semiconductor with two possible conformations : a chair like conformer (in which hydrogen atoms are alternating on both sides of the plane) and a boat like conformer (in which hydrogen atoms are alternating in pairs). Although, experimental evidence for Graphene is yet to come up; Graphane could find applications in hydrogen storage and two dimensional electronics.

### References :

- [1] J. O. Sofo, A. S. Chaudhari, G. D. Barber, Physical Review B 75 (2007) 153401.