Low cost delamination process to isolate high quality graphene

Researchers from the Instituto de Microelectrónica de Barcelona – Centro Nacional de Microelectrónica (IMB-CNM) of the Spanish National Research Council (CSIC) and the consorcio Centro de Investigación Biomédica en Red (CIBER- BBN) have recently developed a novel, simple procedure to isolate highly crystalline graphene, so that it can be transferred from its growth silicon carbide substrate to arbitrarily another one, such as a dielectric for electronic device applications.

Based on graphene epitaxially deposited on affordable SiC wafers, this novel transfer method has been experimentally proved, showing good performance and reproducibility.

Graphene or SiC producers and device makers are being sought to work in collaboration for further developments, e.g. scalability, or to exploit the existing know-how through a patent license agreement.

An offer for Patent Licensing

Green, affordable exfoliation, enabling SiC substrates reuse and recycling

Chemical Vapor deposition (CVD) graphene and Epitaxial Graphene on Silicon Carbide (EG-SiC) are the two preferred synthesis processes for the preparation of highly crystalline graphene.

Applications of CVD graphene often require sacrificial metal catalyst, e.g. by using a FeCl3 based solution, which is a very corrosive and environmental unfriendly chemical. Differently, EG-SiC presents a immediately readiness for electronic devices fabrication, although the use of SiC wafers as substrates makes it in principle expensive as compared to metal foils combined with silicon substrates.

In any case, the exfoliation and transfer of graphene from one substrate to another is a critical processing step. Its elusiveness as a robust process impedes that the graphene can be widely used in e.g. electronic devices, in different fields of application and, importantly, for industrialization or commercialization.

The developed delamination and transfer method relies on using doped SiC wafers, which are cheaper than often required semi-insulating SiC wafers, and does not employ acute toxic chemicals.

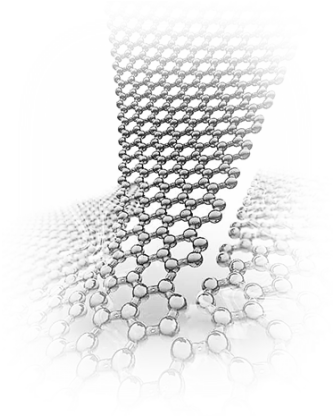

Figure 1. Depiction of a high-quality graphene sheet exfoliation.

Main innovations and advantages

- Versatile and simple transfer. One-step procedure to isolate graphene.
- Easily scalable, fast and modular method. Potentially suitable for mass production.
- Preserving integrity of high quality graphene or its crystal domain/sheet size. No adhesives or mechanical traction by metal thin films are needed.
- Affordable and scalable synthesis. Use of EG grown on doped-SiCsubstrates.
- Environmentally friendly. Delamination in non-hazardous chemicals, reduction of sacrificial materials and possibility of SiC template recycling.
- SiC reusable after graphene exfoliation e.g. for regrowth.

Patent Status

PCT patent application filed

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