TECHNOLOGY

A Reliable, High-Yield Method to Grow Uniform Epitaxial Graphene Precursor Layer on SiC

OVERVIEW

Background:

The global market for graphene based products is projected to be 2 billion dollars after the year 2020 at an annual growth rate of 46.3 %. This trend is mainly attributable to graphene's unique combination of electrical, optical, and mechanical properties, which makes it a top contender for ultra-small, ultra-fast electronics. Researchers today are keen on developing graphene material for a potential of various applications including capacitors, displays, structural materials, sensors, batteries and fuel cells. However, current graphene production techniques produce either poor quality graphene or expensive graphene unsuitable for mass adoption. Specifically, high quality Epitaxial Graphene grown on Silicon Carbide substrates suffers from the formation of Graphene Multilayers (GML), significantly limiting the performance of graphene devices.

Invention:

Researchers from the University of Maryland in collaboration with the National Institutes of Standards (NIST) have developed a unique method to produce large-area, multilayer-free epitaxial graphene. By patterning the SiC substrate in a specific manner before processing and then annealing within a specific temperature range, researchers are able to precisely control the growth of Epitaxial Graphene over the whole substrate while limiting the formation of GML. The as-grown graphene on SiC is ready for device fabrication since SiC substrate is semi-insulating. This process shows potential for wafer-scale production of single crystalline, high-quality graphene, which will greatly reduce the cost of production.

Advantages

· High yield of premium grade epitaxial graphene
· As-grown graphene for fabrication without transfer
· Greatly reduced production costs
· Potential to produce wafer-scale graphene for commercial applications

Applications:

· Metrology Standards
· Transistors
· Ultra-fast electronics
· Optoelectronics
· Sensors

· New platform for two-dimensional materials

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Additional Information

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PATENT STATUS

Pending

EXTERNAL RESOURCES

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