Novel Method to Produce Graphene

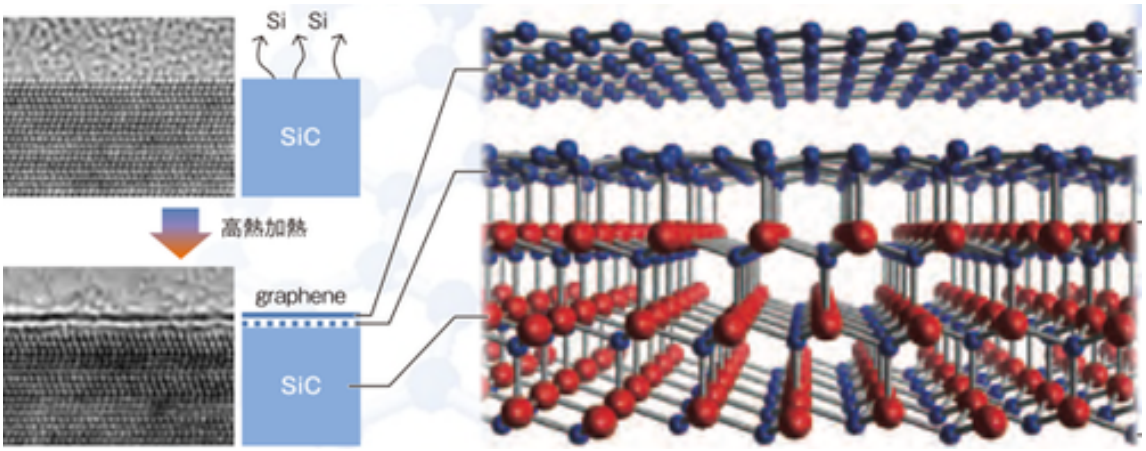
Background

A graphene layer (a graphite sheet) is a monolayer of carbon atoms and its structure shows a six-membered ring of carbon atoms that are densely packed. Graphene has high electron mobility (more than 200,000cm2/Vsec), high melting point and excellent thermal conductivity.
Current methods to produce graphene have inherent problems:

- Difficult to obtain a large-area graphene layer, maximum length of the layer is 200nm
- Relatively many irregularities in an atomic level

Technology Overview

Nagoya University researchers have invented a novel way to produce a graphene/SiC composite material in which one large-area graphene layer, that is flat at an atomic level, is formed on a SiC single crystal substrate



(Figure 1). The process includes the steps of:

1. removing an oxide film that is formed by natural oxidation and which covers a surface of the SiC single crystal substrate, thereby exposing an Si surface of the SiC single crystal substrate;
2. heating the SiC single crystal substrate with the Si surface exposed under an oxygen atmosphere, thereby forming an SiO2 layer on the surface of the SiC single crystal substrate;
3. heating the SiC single crystal substrate under vacuum on which the SiO2 layer was formed.

Further Details

- Epitaxial graphene on SiC {0001}: advances and perspectives, Michiko Kusunoki, et al.
- Physical Chemistry Chemical Physics, Issue 8, 2014
- Structural features of epitaxial graphene on SiC {0001} surfaces, Michiko Kusunoki, et al. Published 12 February 2014 • 2014 IOP Publishing Ltd. Journal of Physics D: Applied Physics, Volume 47, Number 9
- Growth of graphene from SiC {0001} surfaces and its mechanisms, Michiko Kusunoki, et al. Published 6 May 2014 • © 2014 IOP Publishing Ltd. Semiconductor Science and Technology, Volume 29, Number 6
- SPECIAL TOPICS: Recent Progress in Science of Atomic Layers. Growth and Features of Epitaxial Graphene on SiC, Michiko Kusunoki, et al. J. Phys. Soc. Jpn. 84, 121014 (2015) [14 Pages]

Contact

Rena Shimizu, Ph.D., TEL: 919-535-8724 Email: rshimizu@tpnu.org
Technology Partnership of Nagoya University, Inc.
One Copley Parkway, Suite 305, Morrisville, NC 27560

名古屋大学
NAGOYA UNIVERSITY

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Contact

Rena Shimizu, Ph.D., TEL: 919-535-8724 Email: rshimizu@tpnu.org
Technology Partnership of Nagoya University, Inc.
One Copley Parkway, Suite 305, Morrisville, NC 27560

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