TECHNOLOGY

A Faster, Thinner Semiconductor

OVERVIEW

Speed and scaling issues in silicon transfer are forcing researchers to invent new semiconductors and corresponding dielectrics to meet the requirements of the semiconductors industry. In order to continue this trend of scaling down the device size, future transistor materials need to be engineered at atomic and sub-nanoscales to perform functions superior to silicon. The leading candidate for silicon replacement is graphene, which is a single sheet of graphitic carbon that has electron mobilities 100 times greater than silicon.

Researchers at the University of Maryland have developed a novel method for the development of graphene-based high speed transistors and the integration of an “all-carbon-based” graphene conducting channel with a diamond-like-carbon (DLC) dielectric for field effect transistors (FETs). FETs have extensive applications such as improved high speed electronics for communication, and lightweight, flexible, and efficient circuits. Graphene electronics could also be useful for communications and imaging technologies that require ultrafast transistors. As such, they are particularly well suited for military use.

Applications:

• Communications and imaging technologies.
• Lightweight, flexible, and efficient circuits.
• High speed electronics.

Advantages:

• Electron mobility 100 times greater than silicon makes it ideal for high speed electronics.
• Much thinner semiconductor channel material than silicon, which can lead to the fabrication of ultra miniaturized transistors for high density electronics.

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Microelectronics

EXTERNAL RESOURCES

PS-2010-115