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SINGAPORE

Yale-NUS, NUS and UT Austin study sheds new light on graphene

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A team of researchers have established a theoretical framework to understand the elastic and electronic properties of graphene, which could pave the way to "novel flexible and wearable nanoelectric and optoelectronic devices".

PHOTOS

File photo of an engineer checking a semiconductor wafer. (AFP/Sam Yeh)

CAPTION

SINGAPORE: A team of researchers have offered new insight into understanding the properties of graphene - a material highly sought after in the digital electronics and nanotechnology arenas, according to a joint press release by the National University of Singapore (NUS) and Yale-NUS College on Monday (Apr 20).

The researchers from Yale-NUS College, the Center for Advanced 2D Materials and Department of Physics at NUS and the University of Texas at Austin, USA (UT Austin) established a theoretical framework to understand the elastic and electronic properties of graphene.

The research work in Singapore was funded by the National Research Foundation and the Ministry of Education, it added.

FINDING A WAY TO HARNESS GRAPHENE

In 2013, Massachusetts Institute of Technology (MIT) researchers discovered a hybrid material that shares graphene's ability to conduct electrons, while adding the band gap necessary to form transistors and other semiconductor devices. Since then, researchers have been trying to understand the reasons behind the performance of this hybrid material, the press release said.

To fully harness the hybrid material's properties for the creation of viable semiconductors, a robust band gap without any degradation in the electronic properties is a necessary requirement, it added.

Assistant Professor at Yale-NUS College and NUS Department of Physics Shaffique Adam said the team's theoretical framework is the "first of its kind".

"Prior to our work, it was commonly assumed that when one 2D material is placed on top of another, they each remain planar and rigid. Our work showed that their electronic coupling induces significant mechanical strain, stretching and shrinking bonds in three dimensions, and that these distortions change the electronic properties.

'Going forward, we will continue to theoretically explore the optimal parameters to create larger band gaps that can be used for a wide range of technologies," he said.

Mr Pablo Jarillo-Herrero, the Mitsui Career Development Associate Professor of Physics at MIT, added: "If we are able to increase the magnitude of the band gap through new research, this could pave the way to novel flexible and wearable nanoelectronic and optoelectronic devices."

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