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Graphene Can Be Molded with Water

Droplets enable the creation of new structures

By **Tudor Vieru**, Science Editor
17th of December 2009, 12:01 GMT

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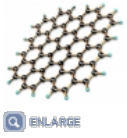
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The carbon-compound graphene is perhaps one of the most promising materials in the world today. Discovered only in 2004, it has already proven its worth many times over, and is recognized as having some of the most bizarre physical and chemical traits encountered in an easily mass-producible material. But one of the main difficulties that experts encountered in working with it was their inability to find ways of molding the carbon compound into various shapes and sizes. This obstacle has recently been surpassed, with chemists at the University of Illinois in Chicago (UIC) creating a new method of custom-molding graphene.

The method relies on nothing more than water droplets to get the job done, the team reports. "Up until now, it wasn't thought we could controllably fold these structures. But now we know how to shape graphene by using weak forces between nanodroplets carefully positioned on graphene sheets," UIC Assistant Professor of Chemistry Petr Kral explains. He reveals that a single nanodroplet of water has the ability to open up an entirely new class of structures that are now possible.

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At this point, engineers are capable of cutting graphene into naoribbons using advanced, nanoscale cutting methods, but they are unable to fold it to custom specifications. Using an advanced computer model, scientists at the UIC demonstrated that forces acting on a small scale, called the van der Waals forces, could create interesting interactions between the water droplet and the graphene sheet. The kicker is that the two elements of the reaction do not undergo a direct chemical reaction. In other words, the simulation shows that water can shape graphene without mixing with it, e! Science News reports.

"Depending on the size of the water droplet and the shape and size of graphene flake used, we can fold it in different shapes for various applications. It's similar to the way proteins are folded in biological cells with the help of chaperon proteins," Kral reveals. "We're trying to detect signals from the biological world or pass signals to the biological world. In the future, perhaps proteins will evolve to interact with inorganic systems. It's a way of evolution to form a new interface, or hybrid system, working together on novel functions." Details of the work appear in a recent issue of the respected scientific journal Nano Letters, and are also highlighted in the December 17 issue of the journal Nature.

TAGS: graphene | water | nanodroplets | van der Waals forces | innovation

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