

Twisting Graphene Nanoribbons into Carbon Nanotubes

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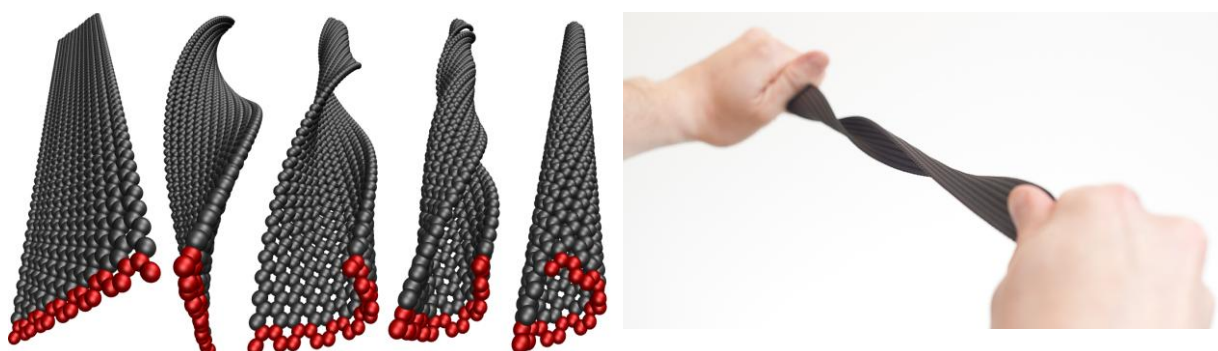
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For the past 20 years carbon nanotubes have been tributed as "rolled up graphene," though no one ever really did the rolling. Here we predict that, indeed, long and narrow graphene ribbons can be rolled into carbon nanotubes by means of twisting.[1] As today carbon nanotubes, along with many other nanomaterials, are made by atom-by-atom growth, the twisted proposal makes up a quite a different nano-fabrication method. The basic idea, however, is simple and easily grasped: just twist the ends of a strap of your backpack and watch the result (see figure). Therefore the mechanism, being classical in origin, is robust and valid in macro-, micro-, and nano-scales. Mechanism also enables experimental control, so it can be used to make carbon nanotubes controllably, to make various kinds of novel carbon nanotubules, to encapsulate molecules inside tubes, or to make tubules from ribbons made of other planar nanomaterials.

References

[1] O. O. Kit, T. Tallinen, L. Mahadevan, J. Timonen, and P. Koskinen, Phys. Rev. B (Editor's Suggestion) [in print] (2012)



Left: Snapshots from quantum simulation of a 24-Å wide zigzag graphene nanoribbon being twisted into a pristine (9,3) carbon nanotube. Right: The concept of tube formation can be illustrated simply by twisting the ends of a strap of a backpack.