Controlled folding of 2D materials: Grafin Printing

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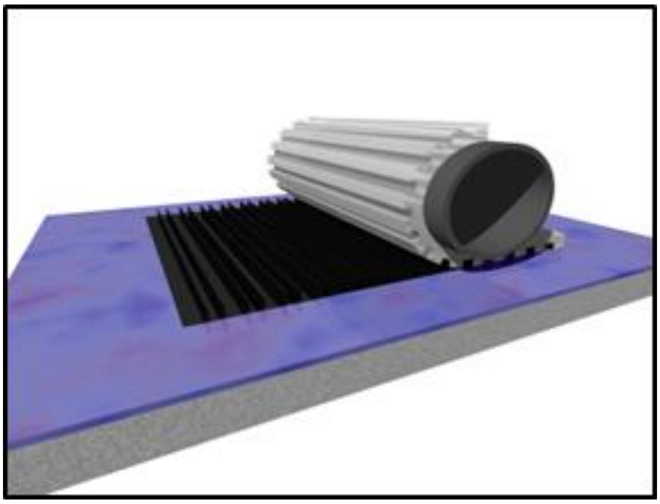
Abstract

Graphene and other two-dimensional materials exhibit an overwhelming abundance of novel electronic and mechanical properties.[1, 2] In the last few years significant inroads have been made on shaping, patterning, doping and processing of these materials to create novel technological applications. However, such approaches have generally ignored the ability for flat 2D materials to fold and crease, while typically considered any such deformations to be unwanted.[3] This is in fact surprising, since the ability to fold graphene is actually one of the few properties that are entirely unique to 2D materials; a truly new avenue that 3D materials are in no way capable of following.

At the current state of the art the only attempts at studying electronic transport through folds in 2D materials have been in graphene via isolation of accidental, naturally formed wrinkles. Such approaches rely heavily on luck and painstaking processes of locating the wrinkles and aligning electrodes to where they happen to occur. This lack of control over crease formation and precise morphology has severely hampered systematic investigation of folded graphene's theoretically predicted properties.[4, 5]

To address this issue we have developed a novel transfer-printing technique, *grafin printing*, to controllably introduce free-standing folds and pleats into graphene and other 2-dimensional materials.[6] This technique, when combined with the growing body of theoretical work on the properties of folded 2D materials offers a route to fundamental science, new device architectures and faster, more compact electronics.[7, 8]

Figures



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