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Carbon Nanoscrolls from CVD Grown Graphene

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We report a simple way of fabricating high-quality carbon nanoscrolls (CNSs) by taking advantage of strain relief due to large difference in strain at the interface of graphene and underlying layer. This method allows strain-controlled self rolling-up of monolayer graphene during etching process at predefined positions on SiO₂/Si substrates by photolithography. The size and the length of the CNSs can be easily controlled by adjusting the thickness of the underlying layer and by pre-patterning. Raman spectroscopy studies show that the CNSs is free of significant defects, and the electronic structure and phonon dispersion are slightly different from those of two-dimensional graphene. The preparation of high-quality CNSs may open up new opportunities for both fundamental and applied research of CNSs.

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