

Stable Nanopores in Graphene

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Technology Summary

Solid state and biological nanopores are suitable for a wide range of applications including molecular translocation, water purification and gas separation devices. A key driving force for nanopore research has been the prospect of DNA sequencing. The major roadblock to high-resolution DNA sequencing is the production of small, thin pores. The length of the pore channel can be reduced ultimately to a single layer of atoms through the use of graphene monolayers. Fabrication of nanopores in graphene have been reported, but there has been no evidence that the created pores were actually formed in single-layers and no direct evidence of stable pores with diameters less than 5 nm. In fact, it is now known that small holes in graphene are unstable against filling by adatoms (especially carbon adatoms). We have invented an approach to stabilize sub-nanometer sized pores in single-layer graphene that will, for example, allow single-base resolution of DNA molecules.

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