

Continuous Single Crystal Growth of Two Dimensional Materials

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Technology Summary

The invention comprises a universal and scalable approach for manufacturing 2D single crystals, with a demonstration of its utility using graphene as an example. The approach is based on chemical vapor deposition (CVD) but differs from its standard batch implementation by utilizing a local control of the precursor concentrations and it is imperatively suitable for roll-to-roll configuration. It naturally yields continuous single crystal graphene of potentially unlimited dimensions despite using a regular polycrystalline foil as a substrate. Consequently, it paves the way for inexpensive production of ultimate quality 2D materials. Using the proposed approach, we have synthesized graphene single crystals up to 8 cm long and showed that they are sufficiently strong to withstand transfer to other substrates without use of polymer supporting layers thus also eliminating a well-known polymer residue contamination problem ubiquitous in the handling of 2D materials.

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