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Controlled formation of nano-domains in two-dimensional heterostructures

Nanoscale structures are of great interest both for basic science and for potential technological applications. In particular, when two or more nanostructures are combined together, the resulting architecture – i.e., a nanoscale heterostructure – may exhibit new properties that are different from those of the individual components. The advent of two-dimensional materials has provided the ideal platforms where such heterostructures can be envisioned. Notably, owing to their similar lattice parameters but complementary electronic properties, graphene and hexagonal boron nitride are with no doubt the optimal building blocks for fabricating novel nanoscale heterostructures. However, the ability to fabricate nanoscale domains in two-dimensional materials is extremely challenging, and a reliable synthesis protocol is still unavailable. Here, I will review the current progress in the field, with particular attention to the reports about formation of planar heterostructures, i.e. architectures where two individual two-dimensional materials are integrated within a single atomically thin sheet.

Biography

Luca Camilli has completed his PhD in Physics in 2012 from University of Tor Vergata, in Rome (Italy). He later moved to Brookhaven National Laboratory (NY, USA), where he started working on two-dimensional materials under the supervision of Dr. Sutter. Currently, he is a Marie Curie fellow at the Danish Technical University (Denmark). His research interests are synthesis and applications of two-dimensional materials, especially graphene and hexagonal boron nitride.

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