Catalytic growth of 2D carbon monolayer with controlled crystallinity: from amorphous to single-crystalline

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Abstract

Large-area graphene has been grown by catalytic chemical vapor deposition (CVD) on various metal substrates. However, the uniform growth of defect-free single-crystal graphene over wafer-scale areas remains a challenge toward the commercial realization of various electronic, photonic, mechanical, and other devices based upon the outstanding properties of graphene. In this talk, control of crystallinity during the catalytic growth of single-atom-thick 2D carbon layer will be presented. A hydrogen-terminated germanium (Ge) substrate is a promising candidate for the growth of carbon monolayer, because of (i) its reasonably good catalytic activity for the catalytic decomposition of carbon atoms on the surface, (ii) the extremely low solubility of carbon in Ge even at its melting temperature, enabling growth of complete carbon monolayer. In particular, the anisotropic atomic arrangement of single crystal Ge surface enables uniform growth of single-crystal monolayer graphene [1]. Etch-free dry transfer and possible applications of the obtained carbon monolayers will also be discussed.

References

[1] Lee, J.-H. et al. Wafer-Scale Growth of Single-Crystal Monolayer Graphene on Reusable Hydrogen-Terminated Germanium. *Science* **344**, 286-289 (2014).