Silane-Catalyzed Single-Crystalline Graphene Growth on Hexagonal Boron Nitride

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Hexagonal boron nitride (*h*-BN) is considered as an ideal substrate for graphene, on which superior graphene properties are demonstrated. Direct graphene growth on *h*-BN by chemical vapor deposition (CVD) were already realized but with very low growth rate, because of the absence of catalyst. With extensive investigations, we discovered that silane, can serve as a gaseous catalyst, boosting the graphene growth rate by 2-3 orders of magnitude, yielding in single crystalline graphene domain size up to 20 μm, with more than 90% of the grains aligned precisely with the *h*-BN substrate. Preliminary results show that the edges of graphene can be tuned from pure armchair to pure zigzag. The results may stimulate further research on the graphene/*h*-BN hetero-structure and graphene/h-BN super-lattice, which may have profound impact on graphene research in the future.

Most recent results on the CVD synthesis of single layered *h*-BN grains over 100 μm and inch-sized single crystal graphene wafer will also be briefly presented.