Toward single-crystal 2D materials on wafer scale

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Although large-area polycrystalline 2D materials have been realized by chemical vapor deposition, the structure defects such as grain boundary and point defects still degdrades the unique material's properties. Here, we present the unique strategy of the self-collimation for the synthesis of single-crystal hexagonal boron nitride (SC-hBN) on a wafer scale [1]. The self-collimation bewteen hBN grains is induced by the electrostatic interaction between boron and nitrogen atoms at peripheral hBN grains to eventually form the SC-hBN film on a liquid substrate. Furthermore, the synthesis of single-crystal graphene and transition metal dichalcogenides film on SC-hBN via epitaxial growth technique is demonstrated. The detailed growth mechanism and anlaysis will be presented.

References

[1] J. S. Lee et al. Science, accepted in 2018.