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Direct Evidence for van der Waals Hetero-epitaxy of Graphene on Hexagonal Boron Nitride HAOMIN WANG, State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Science, SHUJIE TANG, ANG LI, XIAOMING XIE, MIANHENG JIANG, State Key Laboratory of Functional Materials for Informatics, SIMIT, CAS — We report on direct evidence for van der Waals (vdW) hetero-epitaxy of graphene grown on hexagonal boron nitride (hBN). Rotational misalignment of graphene on hBN produces a moiré pattern detectable by scanning probe microscopy (SPM) as a small modulation of the probe/surface friction. With the help of moiré interferometry and atomic resolution imaging, we obtained a fundamental insight into the growth behavior of single-crystalline graphene grown on h-BN substrates. It is found that the graphene grown by chemical vapor deposition mainly locks into one crystallographic orientation with respect to the h-BN substrate, while the graphene edges are parallel to armchair direction. The Moiré pattern on graphene/h-BN confirms that the rotational misalignment of graphene is definitely less than 0.05 ° with respect to h-BN. It is also noticed that the vdW interaction plays a critical role in releasing the interfacial stress in the epitaxial graphene on h-BN. Our work shines light on creating artificial moiré interferometry in nanometer scale, which provides an invaluable scientific tool of atomic analyses on graphene based hetero-junction.

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