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Graphene p-n Junctions via Molecular Functionalization REN-JYE SHIUE, Academia Sinica, HUNG-CHIEH CHENG, CHIA-CHANG TSAI, YIT-TSONG CHEN, National Taiwan University, WEI-HUA WANG, Institute of Atomic and Molecular Sciences, Academia Sinica, Taiwan — An essential challenge in graphene-based electronics is to engineer the carrier type and density and still preserve the transport properties of graphene. We report an experimental investigation of graphene $p-n$ junctions via molecular functionalization. By developing a generic scheme for the chemical functionalization, we have shown that an effective and uniform chemical doping of graphene can be achieved by non-covalent modification of the molecules. The effectiveness and uniformity of the modification is systematically confirmed by optical microscopy, surface potential measurement, and Raman spectroscopic imaging. Furthermore, the chemical doping by molecules is utilized to fabricate the graphene $p-n$ junctions. The transport characteristics of the graphene $p-n$ junctions are investigated by transport and magnetotransport measurements. The signatures of the graphene $p-n$ junctions are presented with high carrier mobility, energy splitting of Dirac points, and non-conventional quantum Hall effect.

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