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Synthesis of phosphorous-doped graphene by ambient pressure chemical vapor deposition ANUPAMA GHOSH, RUITAO LV, NESTOR PERERA LOPEZ, AYSE BERKDEMIR, ANA LAURA ELÍAS, HUMBERTO TERRONES, Department of Physics, The Pennsylvania State University, MAURICIO TERRONES, The Pennsylvania State University, Shinshu University — Although theoretical calculations have demonstrated that phosphorous (P) doping of graphene could open the largest band gap and could possess excellent properties to become an ideal toxic gas sensor, it has not been synthesized experimentally. We have successfully synthesized large-area, monolayered P-doped graphene by an ambient pressure chemical vapor deposition (AP-CVD). In particular, triphenyl phosphene (TPP) dissolved in hexane with different concentrations of TPP has been used as phosphorous-carbon precursor. Raman spectroscopy is used extensively for characterizing the different synthesized materials. The intensity ratio of D, D', 2D and G bands and their associated shifts provide information related the nature and doping levels. The strong D-band and a prominent D'-band confirms the occurrence of doping by P-substitution. The doped graphene sheets have also been characterized by high-resolution transmission electron microscopy (HRTEM) and X-ray photoelectron spectroscopy (XPS). In addition, results on the use of these P-doped graphene in molecular sensing will be discussed.

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