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Bias dependent transport property of defective phosphorene.[1] M FAROOQ, ARQUM HASHMI, pukyong National University, CHANYONG HWANG, KRISS, JISANG HONG, pukyong National University — **Phosphorene is receiving great research interests because of its peculiar physical properties. Nonetheless, no systematic studies on the transport properties modified due to defects have been performed. Here, we present the electronic band structure, defect formation energy and bias dependent transport property of various defective systems. We found that the defect formation energy is much less than that in graphene. The defect configuration strongly affects the electronic structure. The band gap vanishes in single vacancy layers, but the band gap reappears in divacancy layers. Interestingly, a single vacancy defect behaves like a p-type impurity for transport property. Unlike the common belief, we observe that the vacancy defect can contribute to greatly increasing the current. Along the zigzag direction, the current in the most stable single vacancy structure was significantly increased as compared with that found in the pristine layer. In addition, the current along the armchair direction was always greater than along the zigzag direction and we observed a strong anisotropic current ratio of armchair to zigzag direction.**

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