Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Anisotropic bias dependent transport property in defective phosphorene Layer JISANG HONG, M. FAROOQ, Department of Physics, Pukyong National University, Korea — We present the electronic band structure, defect formation energy and bias dependent transport property. Both single and divacancy defects have been considered. 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 layer, 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 beliefs, we observe that the vacancy defect can contribute to greatly increasing the current. Along the zigzag direction, both single and divacancy defects contribute to enhancing the current while the I-V characteristics along the armchair direction are dependent on the defect configurations. Despite this defect configuration dependency, we have found that the current along the armchair direction is always greatly larger than that found along the zigzag direction and the anisotropic current ratio of armchair to zigzag direction is an order of 10^3. This was supported by NRF (No. 2013R1A1A2006071) and by the Supercomputing Center/Korea Institute of Science and Technology Information with supercomputing resources including technical support (KSC-2014-C3-052)

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Date submitted: 13 Nov 2014 Electronic form version 1.4