

Abstract Submitted  
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**Electronic Properties of Few-layer Black Phosphorus** LIKAI LI, YIJUN YU, State Key Laboratory of Surface Physics and Department of Physics, Fudan University, G.J. YE, X.H. CHEN, Hefei National laboratory for Physical Science at Microscale and Department of Physics, University of Science and Technology of China, YUANBO ZHANG, State Key Laboratory of Surface Physics and Department of Physics, Fudan University — Black phosphorus is a layered allotropy of phosphorus that closely resembles graphite. In a single atomic layer, phosphorus atoms are covalently bonded into a puckered honey comb structure. All five valence electrons are localized, so unlike graphene monolayer black phosphorus is a semiconductor with a band gap of  $\sim 2$  eV. In a bulk crystal the interlayer coupling reduces the band gap to  $\sim 0.3$  eV. Using mechanical exfoliation method, we have successfully fabricated few layer black phosphorus field effect transistors. Our samples exhibit bipolar behavior with on-off ratio up to  $10^6$ , and a low off-state current. Electronic mobilities up to  $\sim 1000$   $\text{cm}^2\text{V}^{-1}\text{s}^{-1}$  are currently achieved, with possibilities for further improvement. Such characteristics make black phosphorus a potential candidate for future nanoelectronic applications.

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