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**The Effect of Gas Absorption on Multilayer Black Phosphorus Field Effect Transistor** XUE LIU, JIN HU, CHUNLEI YUE, NICHOLAS DELLA FERA, ZHIQIANG MAO, JIANG WEI, Tulane University — Multilayer black phosphorus (BP) is drawing much attention recently due to its reported high mobility (up to  $1000 \text{ cm}^2\text{V}^{-1}\text{s}^{-1}$ ) and on/off ratio (up to  $10^5$ ) as the channel material for field effect transistor (FET). We investigated the interplay between the electrical response of high performing BPFET and gas adsorbate introduced to its surrounding environment. Different type of gas including CO<sub>2</sub>, H<sub>2</sub>O, Ethanol, CO, NO, NH<sub>3</sub>, etc. has been tested. We observed that the absorption of gas molecules generally reduces the overall on-state conductance of the device with an order of  $10 \sim 100$ . And such reduction can be fully recovered by purging with inert gas or baking at mild temperature (about  $100^\circ\text{C}$ ). The absorption dynamics and detailed mechanism are also been investigated. We conclude that multilayer black phosphorus is an excellent material for chemical sensing.

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