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High field transport of high performance black phosphorus transistors[1] XUEFEI LI, Huazhong University of Science and Technology — As an emerging two dimensional layered semiconductor, few-layer black phosphorus (BP), with high mobility and high density of states, has attracted great interest recently due to its great potential in applications for digital electronics and photonics. Despite the tremendous research efforts on BP electronic devices in the past two years, high field transport and current carry capability of BP is still largely missing. Here, we perform a first comprehensive study on most important figures-of-merit such as on-state current, mobility, velocity and interface trap density of BP FETs based on high-k HfO_2 dielectrics in comparison with SiO_2 and push its high field transport much further beyond the current status.

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