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Photo-Detection on Narrow-Bandgap High-Mobility 2D Semiconductors ADAM CHARNAS, GANG QIU, YEXIN DENG, YIXIU WANG, YUCHEN DU, LINGMING YANG, WENZHUO WU, PEIDE YE, Purdue Univ — Photo-detection and energy harvesting device concepts have been demonstrated widely in 2D materials such as graphene, TMDs, and black phosphorus. In this work, we demonstrate anisotropic photo-detection achieved using devices fabricated from hydrothermally grown narrow-bandgap high-mobility 2D semiconductor. Back-gated FETs were fabricated by transferring the 2D flakes onto a Si/SiO_2 substrate and depositing various metal contacts across the flakes to optimize the access resistance for optoelectronic devices. Photo-responsivity was measured and mapped by slightly biasing the devices and shining a laser spot at different locations of the device to observe and map the resulting photo-generated current. Optimization of the Schottky barrier height for both n and p at the metal-2D interfaces using asymmetric contact engineering was performed to improve device performance.

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