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Optoelectronic devices based on $MoTe_2$ p-n junction. YA-QING BIE, Condensed Matter Physics, MIT, MIKKEL HEUCK, EECS, MIT, MARCO FURCHI, Condensed Matter Physics, MIT, GABRIELE GROSSO, EECS, MIT, JIABAO ZHENG, Columbia University, YUAN CAO, Condensed Matter PhysicsEECS, MIT, EFREN NAVARRO-MORATALLA, Condensed Matter Physics, MIT, DIRK ENGLUND, EECS, MIT, PABLO JARILLO-HERRERO, Condensed Matter Physics, MIT — 2D transition metal dichalcogenides (2D-TMD), such as MoS_2, have been verified with many remarkable physical properties, which include an indirect to direct band transition as a function of thickness and a valley dependent spin polarization. One of the 2D-TMD family members, 2H-$MoTe_2$ has been shown to be a direct bandgap semiconductor as a monolayer and bilayer with a near infrared (NIR) bandgap of about 1.1eV. However, optoelectronic devices based on MoTe2 were so far not experimentally demonstrated. Here, we will present a high on-off ratio $MoTe_2$ p-n junction enabled by a hexagonal boron nitride encapsulation technique. Our study of the $MoTe_2$ p-n junction devices sheds light on designing efficient NIR optoelectronic devices such as photodetectors and energy harvesting cells and light emitters.

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