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Electrical and optical properties of SnS_2/WSe_2 van der Waals Heterojunction FETs AHMAD ZUBAIR, AMIRHASAN NOURBAKHSH, MILDRED DRESSELHAUS, TOMAS PALACIOS, Massachusetts Institute of Technology — Two dimensional crystals based on atomically thin films of transition metal dichalcogenides offer an exciting platform for various optoelectronic applications. Their unique crystal properties make them particularly attractive for van der Waals heterostructures which open up an additional degree of freedom to tailor the material properties into new physics and device applications. In this work, we explore, for the first time, the optoelectronic properties of van der Waals SnS_2/WSe_2 heterojunction. WSe_2 is an ambipolar semiconductor while SnS_2 is an n-type wide bandgap semiconductor. We use the pickup and dry transfer methods to fabricate SnS_2/WSe_2 heterojunction transistors (hetero-FETs). We observe negative differential transconductance in the SnS_2/WSe_2 hetero-FET. Also, the heterostructure couples strongly to incident light and shows high photovoltaic responsivity which can find applications in nano-devices such as photo-detectors and solar cells.

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