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Charge and Spin-Valley Transfer in Transition Metal Dichalcogenides Heterostructure SUK HYUN KIM, ELYSE BARRE, ZGR BURAK ASLAN, TONY HEINZ[1], Department of Applied Physics, Stanford University and SLAC National Accelerator Laboratory, YOUNG DUCK KIM, DONGJEA SEO, JAMES HONE[2], Department of Mechanical Engineering, Columbia University, KYUNGNAM KANG, EUI-HYEOK YANG[3], Department of Mechanical Engineering, Stevens Institute of Technology — Monolayer transition metal dichalcogenides (TMDC) offer new avenues to control valley and spin polarization based on their valley circular dichroism and spin-valley locking. In this context, interesting issues arise when two TMDC layers are stacked in a vertical heterostructure and interlayer charge transfer processes become possible. Here we address the question of whether the spin and valley characteristics of photoexcited carriers are persevered under interlayer charge transfer. We have observed experimentally the preservation of the spin-valley characteristics for MoS_2/ WSe_2 heterostructures. We excite the A exciton in WSe_2 (˜780 nm) with circularly polarized ultrafast pump radiation. The spin-valley characteristics of the transferred charge are examined through the induced Kerr rotation for both the A (˜670 nm) and B excitonic (˜620 nm) transitions in MoS_2. These signatures are not observed in either of the separated monolayers, verifying the role of transfer from one layer to another.

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