Interlayer electron-hole pair multiplication by hot carriers in atomic layer semiconductor heterostructures\textsuperscript{1} FATEMEH BARATI, MAX GROSSNICKLE, SHANSHAN SU, ROGER LAKE, VIVEK AJI, NATHANIEL GABOR, Univ of California - Riverside — Two-dimensional heterostructures composed of atomically thin transition metal dichalcogenides provide the opportunity to design novel devices for the study of electron-hole pair multiplication. We report on highly efficient multiplication of interlayer electron-hole pairs at the interface of a tungsten diselenide / molybdenum diselenide heterostructure. Electronic transport measurements of the interlayer current-voltage characteristics indicate that layer-indirect electron-hole pairs are generated by hot electron impact excitation. Our findings, which demonstrate an efficient energy relaxation pathway that competes with electron thermalization losses, make 2D semiconductor heterostructures viable for a new class of hot-carrier energy harvesting devices that exploit layer-indirect electron-hole excitations.

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