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Vertical Field-Effect Transistor Based on Graphene-Transition Metal Dichalcogenides Heterostructures JATINDER KUMAR, HUI-CHUN CHIEN, MATTHEW Z. BELLUS, DAVID L. SICILIAN, DAVIS ST. AUBIN, HSIN-YING CHIU, Physics and Astronomy, University of Kansas, Lawrence, KS, PHYSICS AND ASTRONOMY, UNIVERSITY OF KANSAS TEAM — The remarkable properties of graphene has made it possible to create transistors just few atoms thick. A new development was that the other two-dimensional materials can be stacked on it with atomic layer precision, creating numerous heterostructures on demand. Here, novel vertical field-effect transistor composed of graphene- transition metal dichalcogenides (TMDs) heterostructures is fabricated and characterized at various temperatures. Due to ultrathin nature of these transistors, they present the ultimate limit for electron transport in heterostructures. Tunneling and thermionic transport characteristics are studied among different graphene-TMDs heterostructures. Their electronic properties have been investigated and can be used in vast range of devices.

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