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Tellurium-Organic Thin-Films in Hybrid Electronic Platforms ROBERT IRELAND, HOWARD KATZ, Johns Hopkins University — Vacuum-deposited tellurium (Te) is considered with semiconducting, insulating, and charged organic films for hybrid electronic platforms. Specifically, polycrystalline films of Te and organic semiconductor (OSC) molecules are combined for the first time in bilayer field-effect transistors (FET). Although Te is not ideal for high dynamic range FETs, it serves as a useful test platform in inorganic-organic heterostructures because of high mobility (μ), defined composition, and amenable processing methods. Scanning Kelvin probe microscopy directly confirms the interfacial vacuum level offset for different Te-OSC junctions. By implanting electrostatic charges at the dielectric surface we demonstrate that interfacial fields determine the gate voltage range over which Te shows field-effect in heterostructured FETs. FETs are measured under both continuous and pulsed operation. Pulsed gating influences the measured μ by selectively concentrating charge carriers in semiconductor layers that are farther away from the gate dielectric. FETs comprising various Te-organic junctions gave consistent μ ranging from 0.001 to above 5 $cm^2\ V^{-1}\ s^{-1}$, compared to 2.7 $cm^2\ V^{-1}\ s^{-1}$ for Te deposited on bare silicon dioxide under the same conditions.

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