

Abstract Submitted
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Giant Seebeck Coefficient in V-TCNE thin films¹ AUDREY CHAMOIRE, CHRISTOPHER JAWORSKI, Department of Mechanical Engineering, OSU, CHI-YUEH KAO, Department of Chemistry, OSU, JOSEPH HEREMANS, Department of Mechanical Engineering and Department of Physics, OSU, ARTHUR EPSTEIN, Department of Physics and Department of Chemistry, OSU — The disordered structure of organic conductors results in a naturally low thermal conductivity (κ) but their ZT is known to be low because of their low thermopower (S) and electrical conductivity (σ). Here we report an exception, with results obtained from 220 to 320K for the thermopower of V-TCNE_x (V-(C₂(CN)₄)_x) thin films deposited on a Si wafer (111). At room temperature S=+21.8 mV/K and increases with decreasing temperature. Those values are matched only by very pure semiconductors such as Si at low temperature, Bi nanowires, or strongly correlated electron systems like FeSb₂. The valence band of V-TCNE has a very high density of states over a very narrow energy range, ascribed mostly to vanadium 3d(t_{2g}) orbitals,² which is consistent with the exceptionally large value of S. The dependence of S and σ upon illumination will also be shown, alongside preliminary estimates for the ZT.

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²Y-J Yoo et al., Nat. Mat. **9** 638 2010

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