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Trainable solar cell effect in TPPS4 nanowires.[1] KATHERINE L. VAN AKEN, MARJON ZAMANI, IAN W. HALVIC, Haverford College, ZHENGQING J. QI, A.T. JOHNSON, University of Pennsylvania, WALTER F. SMITH, Haverford College — We have measured photovoltaic currents for self-assembled *meso*-tetra(4-sulfonato-phenyl)porphine (TPPS4) nanowires. This is surprising, given that our devices are symmetrical. However, by "training" the nanowires with a bias voltage, we can break this symmetry. After training, when the nanowires are illuminated with a 488 nm laser under zero bias voltage, a solar cell current is observed, with polarity opposite to the training voltage. The magnitude of solar cell current depends on both the time of training and the magnitude of the training voltage. After the training voltage is removed, the solar cell current decays very quickly initially and then transitions to a much slower decay. This suggests that there are different populations of trapped charges that are repositioned by the electric field of the training voltage, and that are responsible for the solar cell current. We present a qualitative model in which the Schottky barriers at the interfaces with electrodes are affected by these trapped charges, leading to asymmetrical charge transport and thus to the observed current.

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