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Poole-Frenkel emission by carbon nanotube defect sites DENG PAN, BRAD CORSO, PHILIP COLLINS, Department of Physics and Astronomy, University of California Irvine — Single walled carbon nanotubes (SWCNTs) have a conductance that is particularly sensitive to the presence of defects and disorder. Here, we fabricate field effect devices out of individual SWCNTs in order to investigate this effect. The bias- and gate-dependent conductance of SWCNT devices is measured over a temperature range of 77 – 400 K. By performing these measurements on the same SWCNT before and after the incorporation of a point defect, we clearly discern the electronic consequences of the addition. Specifically, the initial recording of the pristine SWCNT determines the energy-dependent resistances of the SWCNT itself. After electrochemical point functionalization to introduce a defect site, the additional resistance and its energy-dependence is determined by properly accounting for the initial contributions. We find the defect scattering to be well fit by a Poole-Frenkel emission model, with the consequence that barrier widths and heights can be extracted for different defect types.

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