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Anisotropic electronic transport in highly aligned carbon nanotube films SEBASTIEN NANOT, XUAN WANG, JUNICHIRO KONO, ECE Dpt, Physics and Astronomy Dpt, Rice University, YANHUA DAI, RUI-RUI DU, Physics and Astronomy Dpt, Rice University, CARY PINT, ROBERT H. HAUGE, Smalley Institute for Nanoscale Science and Technology, Rice University — Electronic transport in carbon nanotube (CNT) networks has recently attracted much renewed interest due to the numerous advancements in controlling, sorting, and aligning CNTs. Understanding the roles of intra-tube and inter-tube transport in these systems is fundamentally important both from basic and applied points of view. We have studied samples of ultra-long and highly-aligned CNTs grown by CVD and laid down on Si/SiO₂ substrates. We designed and fabricated a novel device structure in which we can separately study intra-tube and inter-tube transport. In the intra-tube configuration, ends of ultra-long CNTs were contacted and the current parallel to the alignment direction was measured, whereas, in the inter-tube configuration, transport perpendicular to the alignment direction was probed. We studied the magnetic field and temperature dependence of the resistance between 0.3 K and 300 K, revealing an interesting evolution of transport regimes as for the localization of charge carriers. Preliminary results of photoconductivity measurements will also be presented.

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