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Superconductivity in Bundles of Double-Wall Carbon Nanotubes[1] ZHE WANG, WU SHI, The Hong Kong University of Science and Technology, QIUCEN ZHANG, Princeton University, YUAN ZHENG, CHAO IEONG, MINGQUAN HE, ROLF LORTZ, YUAN CAI, NING WANG, TING ZHANG, HAIJING ZHANG, ZIKANG TANG, PING SHENG, The Hong Kong University of Science and Technology, HIROYUKI MURAMATSU, YOONG AHM KIM, MORINOBU ENDO, Shinshu University, PAULO T. ARAUJO, MILDRED S. DRESSELHAUS, Massachusetts Institute of Technology — We will present electrical and thermal specific heat measurements that show superconductivity in double-wall carbon nanotube (DWCNT) bundles. Clear evidence, comprising a resistance drop as a function of temperature, magnetoresistance and differential resistance signature of the supercurrent, suggest an intrinsic superconducting transition below 6.8 K for one particular sample. Additional electrical data not only confirm the existence of superconductivity, but also indicate the Tc distribution that can arise from the diversity in the diameter and chirality of the DWCNTs. A broad superconducting anomaly is observed in the specific heat of a bulk DWCNT sample, which yields a Tc distribution that correlates well with the range of the distribution obtained from the electrical data. As quasi one dimensionality of the DWCNTs dictates the existence of electronic density of state peaks, confirmation of superconductivity in this material system opens the exciting possibility of tuning the Tc through the application of a gate voltage.

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