390

Title:Absorption spectra of high purity metallic and semiconducting single-walled carbon nanotube thin films in a wide energy region

Authors:Ichida, Masao (1); Saito, Shingo (2); Nakano, Tadashi (1); Feng, Ye (3); Miyata, Yasumitsu (4); Yanagi, Kazuhiro (5); Kataura, Hiromichi (3); Ando, Hiroaki (1)
Author affiliation:(1) Department of Physics, Konan University, 8-9-1 Okamoto, Higashinada-ku, Kobe 658-8501, Japan; (2) National Institute for Information and Communications Technology, 588-2 Iwaoka, Nishi-ku, Kobe 651-2492, Japan; (3) Nanotechnology Research Institute, Advanced Industrial Science and Technology, Central 4, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8562, Japan; (4) Department of Chemistry, Faculty of Science, Nagoya University, Fro-cho, Chikusa-ku, Nagoya 305-8562, Japan; (5) Department of Physics, Faculty of Science, Tokyo Metropolitan University, 1-1 Minami-Ohsawa, Hachioji, Tokyo 192-0397, Japan
Corresponding author:Ichida, M.(ichida@konan-u.ac.jp)

Abstract:Absorption spectra of high purity metallic and semiconducting single-walled carbon nanotubes separated by the density-gradient ultracentrifugation method have been measured in the wide energy region from 1 meV to 5 eV. In the high purity metallic nanotube sample, a strong and broad absorption band has been observed at 0.06 eV. This observation suggests that the optical properties of even high purity metallic nanotube bundles cannot be explained by the simple Drude conduction model. We discuss the origin of these absorption bands for metallic and semiconducting nanotube samples by considering the existence of a small energy gap in metallic nanotube bundles and plasmon resonance.

Number of references:17