

# Probing Optical Transitions in Individual Carbon Nanotubes Using Polarized Photocurrent Spectroscopy

Mon, 2013-02-11 15:43 - [Daniel Rudolph](#) [1] **Date:** 2012-10-15

**Author(s):**

M. Barkelid, G. A. Steele, and V. Zwiller

**Reference:**

Nano Lett. 12, 5649 (2012)

**URL:**

<http://pubs.acs.org/doi/abs/10.1021/nl302789k> [2]

Carbon nanotubes show vast potential to be used as building blocks for photodetection applications. However, measurements of fundamental optical properties, such as the absorption coefficient and the dielectric constant, have not been accurately performed on a single pristine carbon nanotube. Here we show polarization-dependent photocurrent spectroscopy, performed on a p-n junction in a single suspended semiconducting carbon nanotube. We observe an enhanced absorption in the carbon nanotube optical resonances, and an external quantum efficiency of 12.3% and 8.7% was deduced for the E11 and E22 transitions, respectively. By studying the polarization dependence of the photocurrent, a dielectric constant of  $3.6 \pm 0.2$  was experimentally determined for this semiconducting carbon nanotube.

- [00. QUANTUM INFORMATION SCIENCE](#) [3]
- [SOLID](#) [4]

**Source URL:**

<http://qurope.eu/db/publications/probing-optical-transitions-individual-carbon-nanotubes-using-polarized-photocurrent>

**Links:**

[1] <http://qurope.eu/users/drudolph>

[2] <http://pubs.acs.org/doi/abs/10.1021/nl302789k>

[3] <http://qurope.eu/category/qics/00-quantum-information-science>

[4] <http://qurope.eu/category/projects/ips/solid>