

## **Optical characterization of carbon nanotubes**

Cristiano Fantini

University of Illinois at Urbana-Champaign, Urbana, IL, USA

Optical spectroscopies such as Raman scattering, optical absorption and photoluminescence have been largely used for the nanotube characterization. The chiral indices  $(n,m)$ , which define the nanotube structure, as well as the exciton transition energies associated with each  $(n,m)$  can be determined optically by these techniques. An important advance in the view of the metrology of carbon nanotubes is the determination of the relative population of each carbon nanotube specie present in a sample. The nanotube population can be obtained by combining different optical techniques and theoretical calculations. The precise characterization of the specific nanotube population is an important issue for the chemical process of nanotube separation by either diameter or electronic type, i.e. metallic or semiconducting, which is essential for potential nanotube applications such as development of nanotube-based electronic devices and sensors. A review of the recent advances in the optical characterization of carbon nanotubes will be presented, including the use of optical spectroscopies to characterize chemical modifications in carbon nanotubes. The presence of defects will be also discussed.