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Characterisation of Carbon Nano-Materials with the Confocal Raman AFM KLAUS WEISHAUPT, THOMAS DIEING, MATTHIAS KRESS, UTE SCHMIDT, WITec GmbH, Ulm, Germany — Graphene and carbon nanotubes represent perfect model systems for fundamental research. Carbon nanotubes have proven to be unique systems for the study of Raman spectra in one-dimensional systems. Although the diameter of single walled carbon nanotubes (SWCNT) is far below the optical resolution limit, its unique optical and spectroscopic properties due to the one-dimensional confinement of electronic and phonon states leads to resonant enhancement of the corresponding photophysical process. Characteristic for SWCNT only are the radial breathing modes (RBM) providing information about the diameter of the carbon nanotube. The position and width of the G-band is used to distinguish between metallic and semiconducting SWCNT and to probe the charge transfer arising from doping a SWCNT. The G' band, characteristic for interlayer coupling in graphite, arises from phonon resonance in SWCNT. Graphene shows similar unique properties and is a perfect model system for Raman spectroscopy in a two-dimensional system. The combination of two different analytical techniques such as confocal Raman microscopy and atomic force microscopy (AFM) in one instrument, allow the topographical and optical characterization of carbon nano-materials.

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