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Raman Spectroscopy characterization of individual triple-walled carbon nanotubes THOMAS HIRSCHMANN, PAULO ARAUJO, MILDRED DRESSELHAUS, Massachusetts Institute of Technology, USA, KORNELIUS NIELSCH, University of Hamburg, Germany — The characterization of individual triple-walled carbon nanotubes (TWCNT) was studied in detail by using Raman spectroscopy resonant signals taken with various laser excitation energies. TWCNTs are in fact an assembly of three concentric weakly coupled single-walled carbon nanotubes (SWCNTs) or, equivalently, a double-walled carbon nanotube (DWCNT) concentric to an external SWCNT. An isolated TWCNT consists of an inner, middle and outer tube, each of which can be either metallic or semiconducting. All of the eight possible combinations provide a multitude of information about the electrical and optical properties. Among numerous applications, TWCNTs offer an ideal structure to study and understand how an interacting medium influences the properties of both, SWCNTs and DWCNTs structures. The measured spectra show exceptionally distinctive radial breathing modes, G-, G'-band and further modes of the three concentric tubes. All of the Raman three bands described above are very sensitive to changes in the structure of each tube. By following the spectral changes of these frequency modes, we can extract important information about, for example, the respective tube distances, inter-tube interaction in TWCNTs systems and its consequences on their related SWCNTs and DWCNTs counterparts.

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