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A Novel Vibrational Mode in Carbon Systems MORINOBU ENDO, Shinshu University, Japan, MAURICIO TERRONES, IPICYT, Mexico, Y.A. KIM, TAKUYA HAYASHI, HIROYUKI MURAMATSU, Shinshu University, Japan, RI-ICHIRO SAITO, Tohoku University, Japan, FEDERICO VILLALPANDO-PAEZ, SHIN GRACE CHOU, MILDRED S. DRESSELHAUS, MIT, USA — We report on the identification of a novel resonant Raman mode located at *ca.* 1850 cm^{-1}, which is related to vibrations of linear carbon chains. This mode, termed ?the coalescence inducing mode? (CIM), was observed during the merging of highly purified double-walled carbon nanotubes (DWNTs) induced by thermal annealing and boron doping. In our case, the CIM mode arises from the generation of short 1D carbon chains established covalently between adjacent tubes. These chains trigger nanotube coalescence via a zipper model, and as the tubes merge the CIM vibration disappears. Theoretical calculations demonstrate that this vibrational frequency corresponds to linear chains with a few carbon atoms. The CIM mode could now be used to identify sp hybridized carbon in various systems such as irradiated graphite, polymerized C_{60} molecules, functionalized fullerenes and nanotubes, carbynes, polymers, nanographites, etc.

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