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Structure determination of a nine-wall carbon nanotube by nanobeam electron diffraction. QI ZHANG, ZEJIAN LIU, Department of Physics and Astronomy, the University of North Carolina at Chapel Hill, LU-CHANG QIN, Department of Physics and Astronomy, Curriculum in Applied and Materials Sciences, the University of North Carolina at Chapel Hill, XINLUO ZHAO, YOSHINORI ANDO, Meiji University, Japan — Multiwalled carbon nanotubes are composed of a series of coaxial single walled carbon nanotuebs. While great progress has been made in determining the atomic structure of single-walled carbon nanotubes, few direct measurements of the atomic structure of multiwalled carbon nanotubes have been available. Meanwhile, it is still a challenging task to determine the atomic structure of nanotubes with large diameter. In this work, the atomic structure of a nine-walled carbon nanotube was determined by nanobeam electron diffraction with the assignment of the chiral indices of each and every individual shell. The chiral indices of the innermost tubule has chiral indices [5,5], corresponding to the C_{60} molecule. The diameters are from 0.678 nm to 6.445 nm with inter-shell spacings between the neighboring tubules in the range of 0.309 nm to 0.408 nm, the helical angles from 11.51^o to 30^o, in which eight tubes are falling in the high helicity from 15^o to 30^o.

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