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## Mesoscopic properties of carbon nanotubes and its applications: The present and future

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Carbon nanotubes have been intensively investigated for its fundamental and technical importances. Structural diversities and the related diverse physical properties with large aspect ratios are fascinating. For instance carbon nanotubes are metal and semiconductors depending on its chirality and furthermore the band gap can be tailored by the diamters. Several issues on its fundamental properties have been discussed. We will review some fundamental problems for band structures, molecular quantum wires, homojunctions, single electron tunneling, and quantum conductance. Several issues related to the syntheis of carbon nanotubes including arc discharge, chemical vapor deposition, laser ablation will be extensively discussed. We will further review the applicability of carbon nanotubes on resonator, nanobalance, FET-type transistor, field emission displays, electrode for secondary battery, and hydrogen storage.