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Low Temperature Photoluminescence of Surfactant-suspended SWNTs FLAVIO PLENTZ, HENRIQUE RIBEIRO, MARCOS PIMENTA, ADO JORIO, Universidade Federal de Minas Gerais, MICHAEL STRANO, Univ. of Illinois at Urbana - Champaign — Photoluminescence (PL) has been a powerful method for the investigation of bulk semiconductors and novel artificial low dimensional semiconductor heterostructures such as quantum wells, quantum wires and quantum dots. Recently bright PL from semiconductor, surfactant-suspended, isolated single walled carbon nanotubes (SWNT's) and from isolated SWNT's grown between silicon oxide pillars have been observed. Low temperature PL measurements in pillar suspended SWNT's have also been reported. In this latter study small blue shifts of the PL peak energies and PL excitation energies, and previously unreported PL peaks have been found. In this work we present results on the low temperature photoluminescence of surfactant-suspended SWNT's. We have found that, upon freezing of the SDS-suspended SWNT's solution, the SWNT's remains strongly luminescent. We perform PL and photoluminescence excitation (PLE) measurements in temperatures ranging from 3.5 to 210K, for excitation energies between 0.8 and 1.75eV and compare the results with the PL and PLE maps obtained for the same suspension at 300K. We found different behavior for the energy shifts for distinct nanotubes families. We observe a blue shift in E11 transition for mod(2n+m,3)=1 nanotubes and a red shift is observed for mod(2n+m,3)=2 nanotubes. We discuss our results in terms of temperature and strain effects in the electronic structure. The brasilian authors aknowledge CNPq, FINEP and FAPEMIG.

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