Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Time-resolved photoluminescence of single wall carbon nanotubes CHRISTOPHE VOISIN, SÉBASTIEN BERGER, GUILLAUME CASSABOIS, CLAUDE DELALANDE, PHILIPPE ROUSSIGNOL, LPA-ENS, 24 rue Lhomond, 75005 Paris, France, XAVIER MARIE, LNMO-INSA, Toulouse, France — Time-resolved photoluminescence measurements are performed on ensembles of isolated (6,5) single wall carbon nanotubes after a selective picosecond excitation of the second transition of the semiconducting nanotubes. These measurements give insight into the carrier dynamics in the bright nanotubes. The carrier dynamics in bright nanotubes is non exponential reflecting the inhomogeneous distribution of life times. However two contributions to the relaxation are distinguishable within the experimental resolution : a fast component of the order of 10 ps and a smaller long living component of about 100 ps. When cooling the sample down to 10 K, the relative weight of the slow component increases with a characteristic temperature of 150 K. Only a small increase of about 30% of the quantum yield is observed at low temperature. No clear relation between emission energy and life time is observed. In light of recent publications these results suggest that the monoexponential relaxation process in one single nanotube might be either fast or slow and that the proportion of both kind of processes is modified by the temperature with a typical energy of 15 meV.

Christophe Voisin
LPA-ENS, 24 rue Lhomond, 75005 Paris

Date submitted: 05 Dec 2005 Electronic form version 1.4