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Measurement of the absorption cross section of individual single walled carbon nanotubes STÉPHANE BERCIAUD[1], LAURENT COGNET, Centre de Physique Moléculaire Optique et Hertzienne, Université Bordeaux (France), R. BRUCE WEISMAN, Department of Chemistry, Rice University, Houston ,Texas, BRAHIM LOUNIS, Centre de Physique Moléculaire Optique et Hertzienne, Université Bordeaux (France) — We combined time–resolved and cw luminescence studies on highly luminescent individual (6,5) single walled carbon nanotubes in aqueous environments to yield the first experimental determination of the absorption cross section of individual nanotubes. Luminescence decays systematically exhibited a bi-exponential behavior with a short component (mean 45ps) accounting for most of the integrated signal, followed by a weak tail decaying on a 250 ps timescale. We obtained a mean statistical value of 1.0 10^{-17} cm^2 per carbon atom for nanotubes resonantly excited at their second order optical transition, a value independently obtained by photothermal absorption measurements also performed on individual (6,5) nanotubes. Precise knowledge of the absorption cross section of individual nanotubes is essential for the determination of nanotube quantum yield as well as in quantitative studies of multi-excitonic processes.

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