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Exciton Radiative Lifetimes and Their Temperature Dependence in Single-Walled Carbon Nanotubes YUHEI MIYAUCHI, Institute for Chemical Research, Kyoto University, RYUSUKE MATSUNAGA, HIDEKI HIRORI, Institute for Integrated Cell-Material Sciences, Kyoto University, KAZUNARI MATSUDA, YOSHIHIKO KANEMITSU — We have investigated the radiative lifetimes of excitons in single-walled carbon nanotubes (SWNTs) from simultaneous measurements of the photoluminescence (PL) lifetimes [1] and the PL quantum yields. A high-quality sample of PFO dispersed-SWNTs was used for the PL measurements. The evaluated radiative lifetimes were $\sim 5-15$ ns for SWNTs with diameters $\sim 0.8-1.1$ nm at room temperature. The radiative lifetimes increased with the tube diameter. The exciton spatial coherence volume (length) was of the order 10^2 nm along the tube axis, as deduced from the radiative lifetimes. Furthermore, we discuss the dynamics of bright and dark excitons [2] from the temperature dependence of the radiative lifetime (10 to 300 K).

[1] H. Hirori, K. Matsuda, Y. Miyauchi, S. Maruyama, and Y. Kanemitsu, Phys. Rev. Lett. **97**, 257401 (2006).
[2] R. Matsunaga, K. Matsuda, and Y. Kanemitsu, Phys. Rev. Lett. **101**, 147404 (2008).

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