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Chirality dependence of exciton diffusion in air-suspended single-walled carbon nanotubes[1] A. ISHII, A. YOKOYAMA, M. YOSHIDA, T. SHIMADA, Y. K. KATO, The University of Tokyo — In single-walled carbon nanotubes, exciton diffusion affects the photoluminescence quantum efficiency through substrate- and defect-induced nonradiative decay of excitons, and therefore quantitative characterization of exciton diffusion is important. In the case of air-suspended nanotubes, exciton diffusion lengths can be determined by analyzing the dependence of photoluminescence intensity on nanotube length.[2] As this method requires ∼30 nanotubes for a particular chirality, we have constructed an automated micro-photoluminescence system to characterize air-suspended carbon nanotubes. A three-dimensional programmable stage is used to automatically locate and list the positions of bright nanotubes. Excitation wavelength, intensity, and polarization angle are automatically controlled to fully characterize these nanotubes. Using this system, measurements on hundreds of as-grown air-suspended carbon nanotubes are performed, and data from high quality individual tubes are selected to investigate the chirality dependence of exciton diffusion length.

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[2]S. Moritsubo *et al.*, Phys. Rev. Lett. 104, 247402 (2010).

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