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Exciton diffusion in semiconducting single-wall carbon nanotubes studied by transient absorption microscopy BRIAN RUZICKA, RUI WANG, Department of Physics and Astronomy, University of Kansas, JESSICA LOHRMAN, SHENQIANG REN, Department of Chemistry, University of Kansas, HUI ZHAO, Department of Physics and Astronomy, University of Kansas — We report a spatially resolved transient absorption study of exciton diffusion in a thin films of isolated semiconducting single-wall carbon nanotubes. Spatiotemporal dynamics of excitons injected by a tightly focused pump pulse are studied by measuring differential reflection and differential transmission of a time-delayed and spatially scanned probe pulse. We observe a bi-exponentially decaying signal with a fast time constant of 0.66 ps and a slower time constant of 2.8 ps. Both constants are independent of the pump fluence. The squared width of the exciton density profile increases linearly with time, as expected for a diffusion process. We measured a diffusion coefficient of 200 $\pm$ 10 cm^2/s at room temperature, which is independent of the pump fluence. We additionally investigated the diffusion coefficient at temperatures of 10 and 150 K and found diffusion coefficients of approximately 300 $\pm$ 10 cm^2/s at both.

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