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Exciton Diffusion Measurements in III/V Nanowires using Spatially and Time Resolved Photoluminescence[1] M.A. FICKENSCHER, L.M. SMITH, H.E. JACKSON, University of Cincinnati, J.M. YARRISON-RICE, Miami University, J.H. KANG, Q. GAO, H.H. TAN, C. JAGADISH, Australian National University — We present an optical investigation of transport in GaAs/AlGaAs core shell nanowires utilizing low temperature spatial and time resolved photoluminescence (PL). We use a solid immersion lens (SIL) to achieve a laser spot size and image resolution of 600 nm. With the laser spot fixed on the nanowire, the image of the wire is scanned across the entrance slit of the spectrometer taking time-decays at each point. Thus, we measure the spatial profiles of the exciton distribution in the wire as a function of time. We then extract the diffusion constant from the width squared of each spatial distribution as a function of time. The measured exciton diffusion constants are of the order of 100 $cm^2 s^{-1}$, equivalent to a mobility of 100,000 $cm^2\ V^{-1} s^{-1}$ by using the Einstein relation. These values are comparable to the best hole mobilities seen in modulation doped two dimensional GaAs/AlGaAs heterostructures.

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