

Abstract Submitted  
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**Dynamics of Photo-Excited Carriers in Single InP Nanowires Under High Excitation Density**<sup>1</sup> L.V. TITOVA, T.B. HOANG, H.E. JACKSON, L.M. SMITH, University of Cincinnati, J.M. YARRISON-RICE, Miami University, Y. KIM, H.J. JOYCE, Q. GAO, H.H. TAN, C. JAGADISH, Australian National University — The dynamics of photo-excited carriers in single InP nanowires at low temperature is investigated using time-resolved photoluminescence spectroscopy. Under highly intensity excitation, the photoluminescence spectrum from a single nanowire shows a broad emission band at early times after the excitation pulse indicating the presence of a degenerate, high density electron-hole plasma. At later times ( $> 600$  ps) when the density of carriers decreases, the emission spectrum becomes narrower and converges toward the free exciton emission band. The lifetime of free excitons in a single nanowire is measured to be close to the lifetime of excitons in high quality InP epilayers, indicating the relative insensitive of the carriers to the InP nanowire surface. These results indicate that significant state filling and band gap renormalization occur in single InP nanowires.

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Leigh Smith  
University of Cincinnati

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