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**Transport Imaging in the Near-Field Regime for the Determination of Carrier Diffusion Behavior in ZnO and GaN Nanostructures**[1]

NANCY HAEGEL, Physics Department, Naval Postgraduate School, DANIEL CHISHOLM, Mechanical Engineering Dept., Naval Postgraduate School, LEE BAIRD, R. ADAM COLE, Physics Department, Naval Postgraduate School — Optical imaging of the spatial dependence of recombination luminescence generated at a point source is used to determine minority carrier diffusion lengths in GaN and ZnO nanostructures. By combining the resolution of near-field optics with the localized carrier generation capability of the scanning electron microscope, both diffusion and waveguiding behavior can be directly imaged in a contact-free manner for any luminescent material. This approach has been used to investigate the effect of different shell materials on GaN core/shell nanowires on surface recombination and carrier transport [Baird et. al. Appl. Phys. Lett. 98, 132104(2011)]. In ZnO, transport imaging shows variations in transport behavior depending on growth technique and morphology. Diffusion lengths in excess of 1 $\mu$m have been observed in ZnO nanobelts, consistent with reports of low concentrations of point and extended defects in these materials.

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