

Optical characteristics of GaN-based quantum structures

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Studies on the optical properties related to the built-in internal field and the carrier localization present in various GaN-based structures are essential not only for the physical interest but in designing practical visible and ultraviolet light emitting device applications with better performance and quantum efficiency. We report on the optical characteristics of various dimensional GaN-based structures such as (i) GaN self-assembled quantum dots grown in Stranski-Krastanov mode (0D), vertically-aligned GaN nanorods (1D), graded-In-content InGaN quantum wells (2D), laterally-overgrown GaN pyramids (3D), and GaN epilayers grown on various substrates. We used a wide variety of optical techniques, such as photoluminescence (PL), PL excitation, micro-PL, cathodoluminescence, optically-pumped stimulated emission, and time-resolved PL spectroscopy. An overview and comparison of the optical characteristics of the above GaN-based structures will be given.