Abstract

Quantum dots (QDs) play a significant role in various optoelectronic devices that are integral to daily life. Among the different types of QDs, perovskite nanocrystals (PNCs) and core-shell quantum dots stand out due to their exceptional optoelectronic properties, including high quantum yield, long carrier diffusion lengths, and tunable emission characteristics dictated by their composition and size. These properties make them highly promising for device applications. However, despite their potential, a comprehensive understanding of their photophysical behavior remains incomplete. To unlock their full capabilities, it is essential to investigate various photophysical processes, such as carrier dynamics, quantum dot blinking, and charge carrier transfer mechanisms, using advanced, high-resolution spectroscopic techniques. Here. In particular, fluorescence-based methodologies enable the study of carrier cooling, charge carrier dynamics, and blinking mechanisms, providing valuable insights that can contribute to optimizing the performance of optoelectronic devices. A deeper understanding of these processes will pave the way for enhancing the efficiency and reliability of quantum dot-based technologies.

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