Near-Infrared Phosphors: Unlocking the Potential for Next-Gen LEDs

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Phosphor-converted technology-based NIR light-emitting diodes are a compelling alternative to the conventional infrared light source due to their excellent energy-saving, mobility, and customization capabilities. Producing luminescent phosphors with different tuning structure methods is trustworthy for controlling the range of NIR regions (NIR-I, 700–1000 nm; NIR-II, 1000–1700 nm). Creating isolated luminescent centers of Cr^{3+} and rare-earth elements is the typical inorganic NIR phosphors design strategy. However, this strategy often fails to meet the required quantum efficiency and thermal stability due to concentration and thermal quenching mechanisms. Therefore, exploring alternative approaches to improve the performance of these phosphors is needed. NIR phosphors' luminescence properties of peak position, spectrum distribution, and thermal stability remarkably differ based on the crystal system. This talk will present a more comprehensive analysis of the local environment to improve our understanding of the luminescence properties of luminescent centers and their energy transformation.

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