

Exploring chalcogen-doped zeolites as sustainable alternatives to conventional NIR emitters

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Abstract

Over the last decade, the interest in near-infrared (NIR)-emitting materials has constantly increased, mainly due to their broad applicability in fields such as in vivo imaging, anticounterfeiting tags, and optical communications. However, conventional NIR emitters often face availability limitations and stability issues. This work focuses on developing chalcogen-doped zeolites—using sulfur, selenium, and tellurium—as promising, sustainable alternative NIR emitters. Through controlled incorporation of these elements, tunable emissions and novel emitting species were identified. Proof-of-concept demonstrations validated the applicability of the produced NIR-emitting materials in security systems and phosphor-converted NIR LEDs (pc-NIR LEDs) for veins imaging. This advancement offers a sustainable and efficient alternative to traditional NIR emitters.

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