

Dual-Mode Perovskite Catalyst for Aqueous Contaminant Degradation

Technology Domain: Environmental Technology

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Technology Summary:

This invention introduces a novel catalyst for decontamination of aqueous environments, providing a continuous and highly efficient solution for treating polluted water. The key technical solution is a perovskite material, specifically $\text{BaSn}_{1-x}\text{Cu}_x\text{O}_3$ (where x is between 0.15 and 0.2), synthesized via a solid-state method to create inherent oxygen defects. The key inventive feature is its unique ability to generate reactive oxygen species (RoS), including hydroxyl and superoxide radicals, both in the presence of light (UV) and, crucially, in complete darkness, eliminating the need for external light sources or additional chemical agents.

Results demonstrate exceptional degradation efficiency, with the optimal $\text{BaSn}_{0.8}\text{Cu}_{0.2}\text{O}_3$ composition achieving 75-80% degradation of azo dyes like methyl orange within just 2 minutes under dark conditions. Its primary use is for continuous, 24/7 remediation of water contaminated with organic pollutants, including dyes and pharmaceuticals, transforming them into non-toxic components (CO_2 and H_2O) and aligning with global clean water initiatives.

