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Review

The state-of-the-art development of photocatalysts for degrading of persistent herbicides in aqueous environment

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Highlights

- Photocatalysis is an innovative technology to combat herbicides in water bodies.

- Semiconductor-based photocatalytic degradation of herbicides has been discussed.
- Hybrid technologies are essential in improving the degradation of herbicides.
- Limitations and future opportunities of photocatalysis have been addressed.

Abstract

Herbicides are one of the most recurring pollutants in the aquatic system due to their widespread usage in the agriculture sector for weed control. Semiconductor-based photocatalysts have gained recognition due to their ability to degrade and mineralize pollutants into harmless by-products completely. Lately, many studies have been done to design photocatalysts with efficient separation of photogenerated charge carriers and enhanced light absorption. Photocatalyst engineering through doping with metal and non-metal elements and the formation of heterojunction are proven effective for minimizing the recombination of electron-hole pairs and enlarging the absorption in the visible light region. This review focuses on discussing and evaluating the recent progress in the types of photocatalysts and their performance in the remediation of herbicides in wastewater. The development of innovative hybrid technologies is also highlighted. The limitations and challenges of photocatalysis technology in the present literature have been identified, and future studies are recommended.