

# Nanocomposite Photocatalyst and Method of Degrading Organic Pollutant Therewith

## Abstract

Our patent **US11717810B1** discloses a nanocomposite photocatalyst for degrading organic pollutants under visible light. The material, comprising a metal oxide (ZnO), activated carbon-based support derived from date seeds and gold (Au) nanoparticles, enhances photocatalytic efficiency through synergistic effects. The method ensures rapid degradation of contaminants in wastewater, offering a sustainable and high-performance solution for environmental remediation.

## Introduction

Rapid industrialization and population growth have led to severe ecological disturbances due to toxic pollutants like industrial discharges, dyes, pharmaceuticals, and pesticides. Conventional treatment methods are ineffective, necessitating advanced approaches. Semiconductor-based photocatalysis under visible light is a promising solution. This invention developed a novel ZnO-Au-activated carbon ternary nanocomposite for enhanced photocatalytic degradation.

## Motivation

- Industrialization has caused severe pollution, demanding advanced treatment solutions.
- Conventional methods fail to fully degrade toxic organic contaminants.
- ZnO's wide band gap limits its photocatalytic efficiency under visible light.
- Our newly-developed ZnO-Au-activated carbon ternary nanocomposite enhances photo-degradation performance.

## Methodology

**ZnO** nanostructures were synthesized via a hydrothermal method



**Au/ZnO** nanocomposites were prepared via photochemical reduction using  $\text{HAuCl}_4$  under UV-A irradiation.

**Activated carbon (AC)**

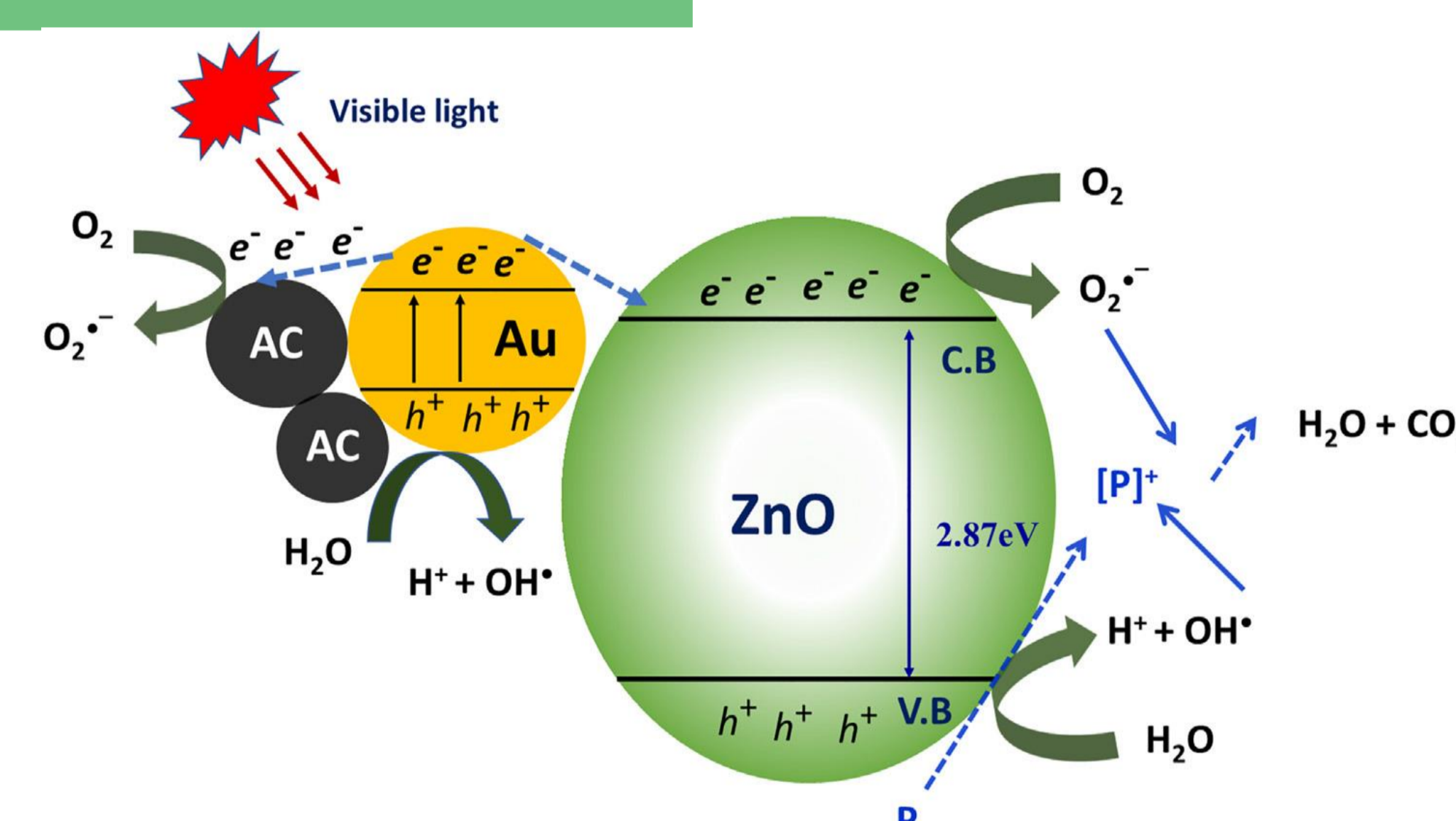
was derived from pyrolyzed date seeds.



Date Seeds → AC

The **AC@Au/ZnO** ternary nanocomposite was obtained via ultra-sonication and filtration.

## Applications



Polluted water



Treated water

## Contact

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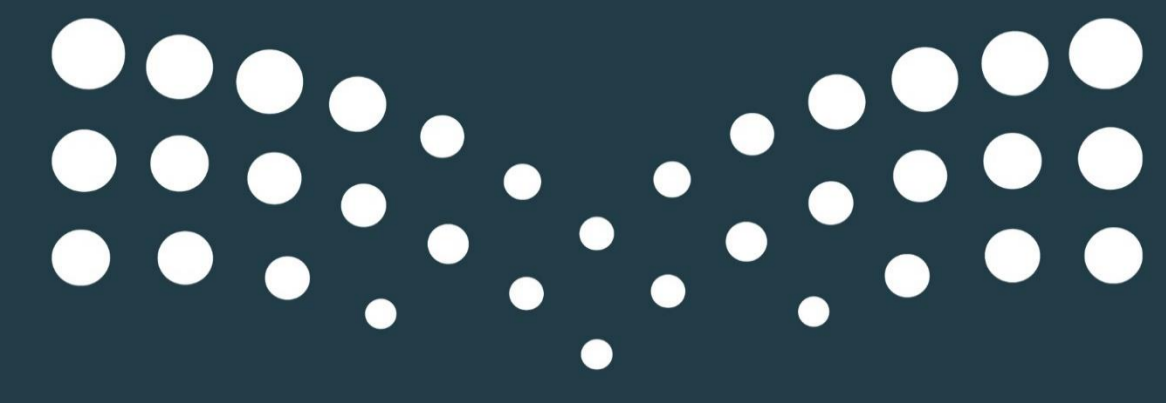
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QR-Patent



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