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Enhancing photocatalytic, photoelectrochemical hydrogen evolution, and dye degradation using p-type $NiCo_2O_4$ spinel photocatalyst synthesized via tapioca leaf extract mediated process

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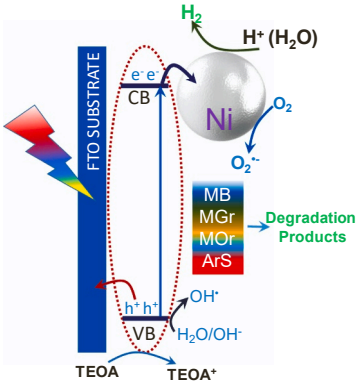
HIGHLIGHTS

- Use of biomass (Tapioca leaf) to prepare advanced NiCoO@TaL material.
- Tailor made NiCoO@TaL for photo-electrochemical and photocatalytic H_2 evolution.
- Multi-dimensional synergy between Ni, Co, and green chemical route.
- Scavenger, TRPL, and Mott-Schottky methods were used to unfold synergism.
- High surface area, good recovery, and reuse of catalyst for eight consecutive cycles.

GRAPHICAL ABSTRACT



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ABSTRACT

The new energetic material is a matter of concern to overcome the environment and energy crisis. The photocatalytic efficiency of $NiCo_2O_4$ prepared via tapioca-leaf extract (NiCoO@TaL) mediated process for environment and energy application are explored in the present work. There was a significant improvement in the photocatalytic hydrogen evolution performance of NiCoO@TaL (1823 umol $g^{-1}h^{-1}$) compared to the NiCoO@TaL in the absence of Triethanolamine (TEOA, 1052 umol $g^{-1}h^{-1}$) and simple physical mixture NiCoO-Phy (526 umol$g^{-1}h^{-1}$. The photoelectrochemical performance of NiCoO@TaL and NiCoO-phy was 0.75 $mAcm^{-2}$ and 0.55

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