Quasi-Molecular Nano-Dielectric Designs For Efficient Particle-Based Photocatalysis

Tech ID: 34318 / UC Case 2025-873-0

BRIEF DESCRIPTION

A novel theoretical model enables efficient and cost-effective solar-driven water splitting to generate clean, storable hydrogen fuel.

FULL DESCRIPTION

This technology harnesses light-to-chemical energy conversion through solar photocatalytic water splitting, utilizing a kinetic Monte Carlo framework that provides guidance for how to design materials that could exhibit not only high quantum yields for photochemical processes like water splitting, but also absorb a significant fraction of sunlight so that overall efficiencies are high in order to achieve the DOE Hydrogen Shot cost target of $1/kg-H2.i.

SUGGESTED USES

- Renewable hydrogen fuel production for energy storage and clean transportation
- Nitrogen reduction for ammonia synthesis in fertilizer production
- Scalable clean energy systems with reduced manufacturing costs and enhanced safety

ADVANTAGES

- Cost-effective hydrogen production to meet the DOE Hydrogent Shot target of $1 per kg
- Elimination of bulky, expensive glass reactors by using lightweight, scalable plastic baggies
- Optimized material design based on detailed light absorption and charge transport simulations
- Safe, renewable, and clean hydrogen generation avoiding explosive or hazardous methods

PATENT STATUS

Patent Pending

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OTHER INFORMATION

CATEGORIZED AS

- **Energy**
  - Other
  - Solar

RELATED CASES

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