

International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

Balapur P.O., Hyderabad – 500005, Telangana, India



Solar Hydrogen Generating Nanostructures Photocatalyst

Overview

Low cost and eco-friendly solar active photocatalytic material is highly desirable to generate hydrogen fuels. Nanostructured ferrite (Fe_2O_3 , MFe_2O_4) and composite systems are potential candidates which can give high quantum yield for water splitting. Titanates (TiO_2) lack the ability to absorb visible light photons. There is need to identify and develop such photocatalysts. Fe_2O_3 and II-VI metal chalcogenide (CdS , CdZnS) systems exhibit ability to absorb solar light photons as well as proper band energetics to split water molecule. They can be used in slurry type solar hydrogen generator.

Key Features

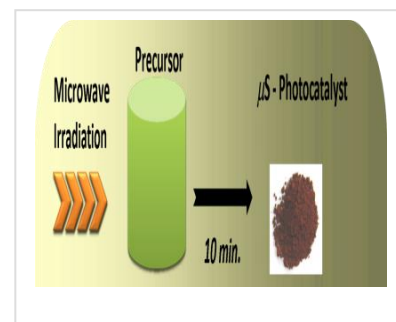
- Rapid nanocrystalline photocatalyst synthesis
- Eco-friendly green photocatalyst
- Scalable synthesis method

Potential Applications

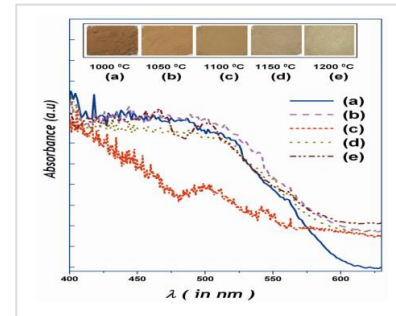
- Solar Hydrogen generator, Fuel gas-cooking, cutting, welding
- Optical material for absorber, photo-chromic display
- Photo-decomposition- Pollutant removal

Intellectual Property Development Indices (IPDI)

- Performance is validated at laboratory scale
- Efficient improvement is



Schematic of rapid photocatalyst synthesis produced by microwave sintering



Optical response of Visible light active photocatalysts

Status	1	2	3	4	5	6	7	8	9	10
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Major Patents / Publications

1. Dom, R, Chary, AS , **Borse, PH**. Solar hydrogen generation from spinel ZnFe_2O_4 photocatalyst: Effect of synthesis methods. INTERNATIONAL JOURNAL OF ENERGY RESEARCH 2015;39(10):1378-1390
2. **Borse PH** et.al.. Synthesis of a hydrogen producing nanocrystalline ZnFe_2O_4 visible light photocatalyst using a rapid microwave irradiation method. RSC Advances 2012;2(33):12782-91
3. **Borse PH**, et al.. Fabrication of $\text{CaFe}_2\text{O}_4/\text{MgFe}_2\text{O}_4$ bulk heterojunction for enhanced visible light photocatalysis. Chemical Communications 2009(39):5889-91

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