Solar electrochemical nano-electrode for H₂ generation /CO₂ conversion

Overview

Photoelectrochemical electrodes exhibiting solar photon absorptivity and long sustainability (>1000hrs) are being developed to achieve 7% solar-to-hydrogen (STH) ratio. Nanostructure semiconductor/chalcogenide and composites (CdS, CdSe, Ga-In phosphide) are important systems used in photoelectrochemical cells (PEC). There is need to develop stable photoelectrode or improve the life of known systems (Fe₂O₃, II-VI metal chalcogenide as CdS, CdZnS). CdS/ CIGS/Si are efficient systems which need to be modified by nanostructuring for sustainable performance. This is best suited with nano-(TiNi oxide) and nano-MoS₂ based systems.

Key Features

- Simple solution process for electrode (film) deposition
- High solar absorption and improved stability
- Scalable manufacturing process

Potential Applications

- Solar PEC H₂ generator, Fuel gas-cooking, cutting, welding
- Optical material for absorber, photo-chromatic display, LED, solar cell
- CO₂ conversion to usable fuel
- Pollutant removal under solar light

Intellectual Property Development Indices (IPDI)

- Performance is validated at laboratory scale
- Sustainable performance under simulated conditions
- Solar-to-hydrogen (STH) ratio of > 3% for stable performing electrodes

Status

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Major Patents / Publications

1. Indian patent granted on "Method of Deposition of double perovskite of Sr Fe Nb-O film on substrate by spray coating technique & the coated substrate thereof" invented by P.H.Borse, - IN 2014DE01151A, Nov 6, 2015
2. Borse, P.H.et.al Stable hydrogen generation from Ni- and Co-based co-catalysts in supported CdS PEC cell Dalton Transactions, 2016; 45 (27), 11120-11128