Manuscript ID : 00000-30283

Source ID : 00000006

International Journal of Advanced Research in Engineering and Technology

Volume 11, Issue 12, December 2020, Pages 406-415, Page Count - 10

FABRICATION OF Cdse-$SmCoO_3$ PHOTOANODE FOR PHOTO-ELECTROCHEMICAL WATER APPLICATION

D. Soumya Rani [(1)] A. Danalakshmi [(2)] A. Cyril [(3)*]

[(1)] Department of Industrial Chemistry, Alagappa University, Karaikudi, India.

[(2)] Research Scholar, Department of Industrial Chemistry, Alagappa University, Karaikudi, India.

[(3)] Post Graduate & Research Department of Chemistry, Raja Dorasingam Government Arts College, Sivaganga, Tamilnadu, India.

Abstract

The perovskite structured SmCoO3 nanoparticles were synthesized via solid sate reaction and CdSe quantum dots (QDs) via hot injection method. The CdSe QDs were functionalized on SmCoO3 nanoparticles using mercaptopropionic acid (MPA), where the CdSe QDS were treated in first with MPA and subsequently with SmCoO3 nanoparticles to from CdSe @ SmCoO3 heterostructure. The crystalline nature and particle morphology were analysed using XRD and TEM techniques. The light sensitive absorption properties of SmCoO3 nanoparticles and CdSe sensitized SmCoO3 were studied using UV-Vis spectroscopy. The band gap is tuned up to 2.4 eV by functionalization of CdSe QDs, while the bare perovskite demonstrated 3.37 eV. This emphasizes the band energy formation and would encourage the photo generated electron transfer from photo-anode to counter electrode for hydrogen evaluation. Photo-electrochemical water splitting studies were conducted in 1M Na2S sacrificial electrolyte with 100 mW/cm2 light illumination effect using three electrode systems. The CdSe/SmCoO3 photo-anode exhibited current density of ~39.5 mA/cm2 under light, while ~32.5 mA/cm2 exhibited in dark at 0.8 V (vs. Ag/AgCl), implying 7 mA/cm2 photo current density achieved at 0.8 V (vs. Ag/AgCl).

Author Keywords

CdSe, SmCoO3, Perovskite, Photo-electrochemical water splitting

ISSN Print: 0976-6480
ISSN Online: 0976-6499
Source Type: Journals
Document Type: Journal Article
Publication Language: English
DOI: 10.34218/IJARET.11.12.2020.043
Abbreviated Journal Title: IJARET
Access Type: Open Access
Publisher Name: IAEME Publication
Resource Licence: CC BY-NC
Major Subject: Physical Sciences
Subject Area classification: Chemical Engineering
Subject area: General Chemical Engineering
Source: SCOPEDATABASE

References (10)

1. Vilas Gaikar
   An Evaluative Study of Poverty Alleviation and Employment Generation Programs: Evidence from India

   (2020) International Journal of Advanced Science and Technology, Volume 29, Issue 5, Page No 11617-11626,

2. Sameer Aziz, Vilas G
   Demographic Variables Influencing Financial Investment Of Urban Individuals: A Case Study Of Selected Districts Of Maharashtra State

(2020) International Journal of Advanced Science and Technology, Volume 29, Issue 5, Page No 962 – 974,

3. Gaikar V
   An evaluation of agricultural trade in India: A special study of selected agricultural commodities

   (2019) IISES International Academic Conference, Page No 88-101,

4. Gaikar Vilas B
   An empirical analysis of trends and opportunities in the Indian healthcare services

   (2017) International Journal of Multidisciplinary Research and Development, Volume 4, Issue 5, Page No 249-252,

5. Gaikar Vilas B. and Dr. Inibehe George Ukpong
   Perceptions of Environmental Footprints of Oil and Gas Extraction in Southern Nigeria

   (2018) AGU International Journal of Research in Social Sciences and Humanities, Page No 198-208,

6. Jacob Cherian, Vilas G
   An empirical study on impact of sustainability-oriented total quality management practices on organizational performance in UAE based organization

   (2020) International Journal of Mechanical and Production Engineering Research and Development, Volume 10, Issue 3, Page No 13667–13678,

7. Rane Caroleena G, and Seenivasan, R.K
   An experimental study on Low-Cost IonExchanger

   (2018) The International Journal of advance research in Science And Engineering, Volume 7, Issue 1, Page No 333 – 339,

8. Seenivasan R. K. and Rane Caroleena
   Removal of some Metal Ions by Low-Cost Composite Ion-Exchangers

   (2018) International Journal of Management, Technology And Engineering, Volume 8, Issue VII, Page No 1125-1131,

9. Seenivasan R. K. and Rane Caroleena
   Synthesis and Characterization of New Ion- Exchange Resin Prepared from the plant Morinda Citrifolia

   (2018) International Journal of Management, Technology And Engineering, Volume 8, Issue VII, Page No 1008-1017,

10. Vilas G
    An overview of Green economy: The challenges ahead of Indian economy

    (2016) International Journal of Multifaceted and Multilingual studies, Volume III, Page No 73-76,