Investigation on the electrocatalytic activity of hierarchical flower like architectured Cu3SnS4 for hydrogen evolution reaction

V. Maheskumar, P. Gnanaprakasam, T. Selvaraju, B. Vidhya

PII: S1572-6657(18)30493-4
DOI: doi:10.1016/j.jelechem.2018.07.027
Reference: JEAC 4177

To appear in: *Journal of Electroanalytical Chemistry*

Received date: 12 October 2017
Revised date: 5 July 2018
Accepted date: 16 July 2018

Please cite this article as: V. Maheskumar, P. Gnanaprakasam, T. Selvaraju, B. Vidhya , Investigation on the electrocatalytic activity of hierarchical flower like architectured Cu3SnS4 for hydrogen evolution reaction. Jeac (2018), doi:10.1016/j.jelechem.2018.07.027

Investigation on the electrocatalytic activity of hierarchical flower like architectured Cu_3SnS_4 for hydrogen evolution reaction

V.Maheskumar[a], P.Gnanaprakasam[b], T. Selvaraju[c] and B.Vidhya[a,d*]

[a] Department of Science and Humanities, Physics, Karunya University, Coimbatore-641 114, India

[b] Department of Science and Humanities, Chemistry, Karunya University, Coimbatore - 641 114, India

[c] Department of Chemistry, Bharathiar University, Coimbatore-641 046, India

[d] Department of Science and Humanities, Nanoscience and Technology, Karunya University, Coimbatore-641 114, India

vidhya@karunya.edu

Abstract

Copper tin sulphide (CTS) a prominent absorber layer in photovoltaics has been explored for its electrocatalytic activity in hydrogen evolution reaction (HER) by splitting of water. Here we report the preparation of CTS by two different methods such as ball milling (CTS (B)) and solvothermal (CTS (S)). Subsequently, due to the morphological difference an attempt has been made to explore the electrocatalytic activity between CTS (B) and CTS (S). As an electrocatalyst, it is found that CTS (S) with flower like architecture shows an enhanced electrocatalytic activity with a lower overpotential, a smaller Tafel slope (76 mV/dec) and much larger exchange current density than CTS (B). Furthermore CTS (S) exhibits high stability in acidic medium and meager degradation even after 2000 cycles toward HER catalytic activity. Enhanced catalytic activity, increased electrochemically accessible flower like morphology, high surface area and significantly improved electrochemical conductivity are observed at CTS (S).

Keywords: Cu_3SnS_4, Ball milling, Solvothermal, Electrocatalyst, HER.