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

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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.

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