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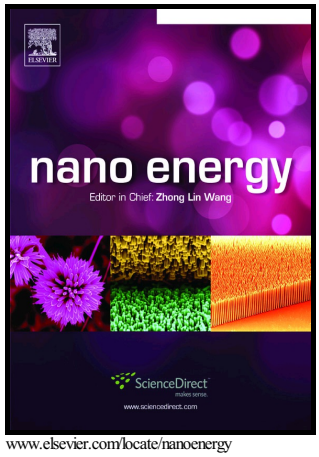

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A solar rechargeable battery based on hydrogen storage mechanism in dual-phase electrolyte

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Abstract

Solar water splitting is an effective approach to hydrogen production and application of solar energy. However, the photo-generated hydrogen should be initially stored in high pressure cylinder and subsequently applied in hydrogen-oxygen fuel cells. Herein, a solar rechargeable battery is proposed based mainly on hydrogen storage mechanism in dual-phase electrolyte. Specifically, the hydrogen production, storage and utilization are integrated into a hybrid system of the dye-sensitized solar cell and electrochemical cell with the dye-sensitized TiO_2 as photo-anode, LiI as the cathode active material in organic electrolyte, AB_5-type hydrogen storage alloy as anode in alkaline solution, and PEDOT-modified Nafion membrane as separator. Here, the photo-generated electrons in organic electrolyte pass to the AB_5-type hydrogen storage alloy to split water in alkaline aqueous electrolyte for generating hydrogen, which is in situ stored into AB_5-type hydrogen storage alloy. Subsequently, the hydrogen stored in the AB_5-type hydrogen storage alloy can be oxidized by electrochemical way to generate electricity, coupled with LiI cathode in organic electrolyte. The solar rechargeable battery demonstrates a new solution of the solar energy

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