Photoelectrochemical water splitting using triple junction solar cell

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Introduction

Solar water splitting can provide a sustainable way to produce hydrogen.

For solar to hydrogen (STH) conversion, it is essential to make stable and efficient STH device.

Triple junction solar cell (TJS) is adopted for efficient light harvesting, and they are protected by TiO2 for enhancing stability.

Sample preparation

Both sides of TJS are covered by electrical contact, TiO2 protection layer and OER/HER catalyst.

Gold or silver are used as an electrical contact on Ge.

I-V Curve

I-V curve is measured using a pogo-pin on TiO2.

Gold contact:

- Voc = 1.2V
- F.F. = 61%

Silver contact:

- Voc = 2.12V
- F.F. = 89%

Ag contact on Ge side can provide high photovoltage and fill-factor compared to Au contact.

Compression cell

Optical window

Electrolyte outlet

Electrolyte inlet

TJS with catalysts

Conclusion

- Ag and Au are tested as a electrical contact.
- Ag gives better photovoltage and fill-factor in I-V curve.
- After solving stability issue, it would be able to realize highly efficient STH conversion device.

Reference


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