HORIZON 2020

Two-dimensional Transition Metal Dichalcogenides as Charge Transporting Layers for High Efficient Perovskite Solar Cells

Berichterstattung

Projektinformationen

SMILIES

ID Finanzhilfevereinbarung: 896211

Projektwebsite

DOI
10.3030/896211

Projekt abgeschlossen

EK-Unterschriftsdatum
17 März 2020

Startdatum	**Enddatum**
1 Juni 2020	31 Mai 2022

Finanziert unter
EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions

Gesamtkosten
€ 172 932,48

EU-Beitrag
€ 172 932,48

Koordiniert durch
FUNDACION BCMATERIALS - BASQUE CENTRE FOR MATERIALS, APPLICATIONS AND NANOSTRUCTURES
Spain

Periodic Reporting for period 1 - SMILIES (Two-dimensional Transition Metal Dichalcogenides as Charge Transporting Layers for High Efficient Perovskite Solar Cells)

Berichtszeitraum: 2020-06-01 bis 2022-05-31

Zusammenfassung vom Kontext und den Gesamtzielen des Projekts

Hybrid organic-inorganic solar energy has grown fast in popularity over the last decade, and it is a rising star among new clean energy sources that are projected to play a key role in optimizing the energy structure and improving the environment. Stability and lead toxicity are now the two key challenges impeding the development of perovskite solar cells.
The project's main goal is to improve device attributes through interfacial engineering, particularly with two-dimensional materials.
Two-dimensional materials have a wide range of nanotechnology uses. Despite their outstanding chemical stability and semiconductor characteristics, 2D materials' poor film-forming capabilities and low vertical conductivity limit their use in electrical devices.
The project's second goal is to use the self-assembly method to create novel materials to address the problem of low vertical conductivity.
Energy is inextricably linked to our daily lives, and no machine can function without it. The vast majority of present energy comes from non-renewable fossil fuels, yet their use can result in environmental pollution and global climate issues. As a result, entire countries have advocated carbon reduction policies. For example, the EU aims to be climate-neutral by the 2050-an economy with net-zero greenhouse gas emissions and China announces carbon neutral by 2060.
Increasing the use of renewable green energy is a cost-effective sound strategy. Solar energy is the cleanest and most abundant free renewable resource that can be converted into thermal or electrical energy. Because of their unique characteristics and solution processing fabrication technology, perovskite solar cells have advanced significantly among photovoltaic technologies.
However, perovskite devices have been hampered in their industrial application due to concerns with stability and lead toxicity. Under the support of the European Commission, the researcher developed a method to boost device stability via 2D materials, which will help to improve device attributes and contribute to the aim of carbon neutrality.

The overall objectives of the project are shown as follows:
1. Fabricating of high-performance perovskite photovoltaic devices via interface engineering;
2. Extending the use of two-dimensional materials to innovative perovskite devices.

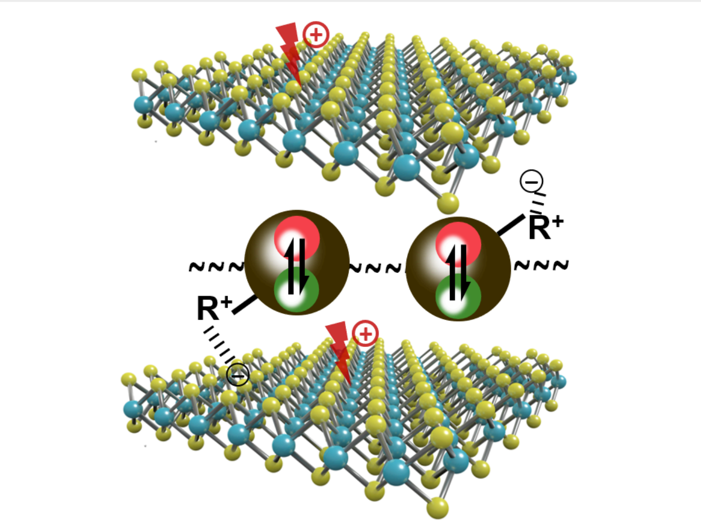
Arbeit, die ab Beginn des Projekts bis zum Ende des durch den Bericht erfassten Berichtszeitraums geleistet wurde, und die wichtigsten bis dahin erzielten Ergebnisse

1. Reporting on how to prepare efficient p-i-n perovskite solar cells and deciphering the electrical parameters of perovskite solar cells using immittance spectroscopy
2. mastered analytical and testing methodologies for transient absorption spectroscopy.
3. increased the use of 2D Materials in new perovskite photovoltaics, achieving efficiency and stability breakthroughs.

The above achievements have been published in 5 papers (4 green and 1 gold Open Access) and participated in one international conference (2021 -
9th International Renewable and Sustainable Energy Conference).

Fortschritte, die über den aktuellen Stand der Technik hinausgehen und voraussichtliche potenzielle Auswirkungen (einschließlich der bis dato erzielten sozioökonomischen Auswirkungen und weiter gefassten gesellschaftlichen Auswirkungen des Projekts)

The following accomplishments have been realized as a result of the effective implementation of this project, which focuses on scientific research of two-dimensional materials and perovskite photovoltaic devices.
1. Using interfacial modification engineering to improve the stability of chalcogenide photovoltaic devices.
2. Application of 2D TMD to novel chalcogenide devices with success
These findings are useful in promoting the use of 2D TMD materials in electronics, which is one of the most promising techniques for addressing chalcogenide photovoltaic stability and improving photoelectric conversion efficiency.
Furthermore, the academic activities undertaken as part of the initiative will raise public awareness of the current energy problem and the promise of scientific research to alleviate it.



3D structure for 2DTMD:organic molecule nanocomposite

Letzte Aktualisierung: 16 November 2022

Permalink: https://cordis.europa.eu/project/id/896211/reporting/de