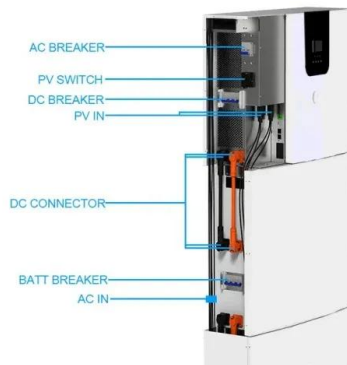


# Chalcogenide perovskites for photovoltaics





## Chalcogenide perovskites for photovoltaics



### Realization of BaZrS3 chalcogenide perovskite thin films for

Recent work involves chalcogenide perovskites for photovoltaic, ultrafast phase change memory materials, topological carbon networks, non-equilibrium growth, excited state dynamics, and unconventional two-dimensional materials and excitonic insulators. He is

### Machine Learning Augmented Discovery of Chalcogenide Double Perovskites

In this work, double chalcogenide perovskites are explored to identify novel photovoltaic absorbers that can replace CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub>. Due to the large space of possible compounds, machine learning methods are used to classify materials as potential photovoltaic absorbers using data from the periodic table, eliminating wasteful computation.



### Chalcogenide perovskites for solar energy applications: The role ...

This study investigates the photovoltaic potential of the chalcogenide perovskite BaZr<sub>1-x</sub>Sn<sub>x</sub>S<sub>3</sub>, where x values of 0, 0.125, and 0.250 were chosen. The band gap of BaZrS<sub>3</sub> (1.7 eV) is slightly larger than the optimal band gap for single-junction devices, and alloying with Sn has been explored to tune the band gap.

### High-throughput screening of chalcogenide single perovskites by ...

double perovskite solar cell is 2.5% on Cs<sub>2</sub>AgBiBr<sub>6</sub> [8]. As an alternative to halide



perovskites, Sun theor- et al etically studied the possibility of chalcogenide perovskites as solar cell absorbers and expected that those materials would inherit the superior 3NH 3

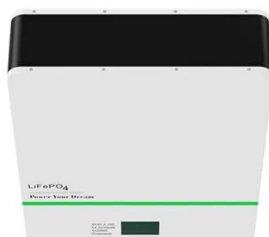


**Defect tolerance in chalcogenide perovskite photovoltaic material**

Chalcogenide perovskites (CPs) exhibiting lower band gaps than oxide perovskites and higher stability than halide perovskites are promising materials for photovoltaic and optoelectronic applications. For such applications, the absence of deep defect levels serving as recombination centers (dubbed defect tolerance) is a highly desirable property. Here, using ...

**Chalcogenide perovskites for photovoltaics: current status and**

Chalcogenide perovskite materials are anticipated to have favourable structural, optical and electronic characteristics for solar energy conversion, yet experimental verification ...



**(PDF) A review of chalcogenide-based perovskites as the next ...**

Chalcogenide-based perovskites, on the other hand have been advanced as promising options, offering improved stability, less toxic compositions, and the potential for more cost-effective, scalable



[\[PDF\] Chalcogenide Perovskites: Tantalizing](#)

Chalcogenide perovskites have recently emerged into the spotlight as highly robust, earth abundant, and nontoxic candidates for various energy conversion applications, not least photovoltaics (PV). Now, a serious effort is required to determine if they can emulate the PV performance of the better-known, part-organic halide perovskites, in applications such as ...



**Chalcogenide Perovskites and Perovskite-Based Chalcohalide as**

In 2015, a class of unconventional semiconductors, Chalcogenide perovskites, remained projected as possible solar cell materials. The MAPbI<sub>3</sub> hybrid lead iodide perovskite has been considered the best so far, and due to its toxicity, the search for potential alternatives was important. As a result, chalcogenide perovskites and perovskite-based chalcohalide have ...



**Ti-Alloying of BaZrS<sub>3</sub> Chalcogenide Perovskite for Photovoltaics**

hundreds of double perovskites, as the most promising photovoltaic materials.<sup>22</sup> Jaramillo et al. provided a strategy for discovering highly polarizable semiconductors including chalcogenide perovskites.<sup>23</sup> Another recent theoretical paper predicted that two 3 Sn 2



**Chalcogenide perovskites for photovoltaic applications: a review**

organic solar cell, perovskite solar cells and quantum dot solar cell (QDSC). They are expected to be cost-effective and more efficient (efficiency comparable to that of silicon-based solar cells) [18-23]. Perovskites The term "perovskite" means "perovskite structure".



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### [PDF] Chalcogenide perovskites for photovoltaics: current status ...

The chalcogenide perovskites provide promising candidates for addressing the challenging issues regarding halide perOVskites such as instability in the presence of moisture and containing the ...



### Photovoltaic properties of $AB\{\mathrm{Se}\}_{3}$ chalcogenide

Lead-free, stable photovoltaic materials with promising optoelectronic features have recently been discovered in chalcogenide perovskites. However, a thorough theoretical analysis of excitonic and polaronic properties has never been done because it would require enormous computing. Here, we elucidate the role of excitonic and polaronic effects in a ...



### Chalcogenide perovskites for photovoltaics: current status and

Chalcogenide perovskite materials are anticipated to have favourable structural, optical and electronic characteristics for solar energy conversion, yet experimental verification of the numerous computational studies is still lacking. In this perspective we summarise





### Machine Learning Augmented Discovery of Chalcogenide Double Perovskites

Pure chalcogenide perovskites such as  $BaZrS_3$ ,  $CaHfSe_3$ , and  $SrSnS_3$  have also been proposed and are predicted to have favorable properties for photovoltaics[26,31-33]. Over the past two years halide double perovskites have been heavily explored. Instead of

### Chalcogenide perovskites--challenges, status, and future prospects

Perovskites dominate the photovoltaic research community over the last two decades due to its very high absorption coefficient, electron and hole mobility. However, most of the reported solar cells constitute organic perovskites which offer very high efficiency but are highly unstable. Chalcogenide perovskites like  $BaZrS_3$ ,  $CaZrS_3$ , etc. promise to be a ...



### Chalcogenide Perovskite $EuHfS_3$

Chalcogenide perovskites represent a promising class of materials known for their robust stability, environmentally friendly composition, and intriguing optoelectronic characteristics. Their A-site In this study, we propose that chalcogenide perovskite  $EuHfS_3$  possesses suitable band gap ( $\sim 1.6$  eV) for p-i-n junction solar cells and antiferromagnetic ...

### Chalcogenide perovskites--challenges, status, and ...

Chalcogenide perovskites like  $BaZrS_3$ ,  $CaZrS_3$ , etc. promise to be a perfect alternate owing to its high stability and mobilities. But, till now no stable photovoltaic device has been successfully fabricated using these materials and ...



### Chalcogenide Perovskite, An Emerging Photovoltaic Material: ...

Chalcogenide perovskite materials came into the picture of photovoltaic technology since 2015. Their admirable structural, electronic and optical properties make them highly promising for solar energy conversion. They have immense potential to solve the stability and toxicity issues of conventional perovskite solar cells. The maximum theoretical power conversion efficiency ...

### Alloying and Defect Control within Chalcogenide Perovskites for

DOI: 10.1021/ACS EMMATER.5B04213 Corpus ID: 101192912 Alloying and Defect Control within Chalcogenide Perovskites for Optimized Photovoltaic Application  
@article{Meng2016AlloyingAD, title={Alloying and Defect Control within Chalcogenide Perovskites for Optimized Photovoltaic Application}, author={Weiwei Meng and Bayrammurad Saparov and ...



### Chalcogenide Perovskite, An Emerging Photovoltaic Material: ...

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**Chalcogenide perovskites for photovoltaic applications: a review**

Chalcogenide perovskite materials are anticipated to have favourable structural, optical and electronic characteristics for solar energy conversion, yet experimental verification ...



[ACS Applied Energy Materials](#)

Chalcogenide perovskites (CPs) have recently emerged as attractive thermally and chemically stable candidates to overcome the inherent instability and toxicity issues of the conventional hybrid organic-inorganic halide perovskites (OIHPs). However, before further progress can be made in CP thin-film photovoltaic (PV) cells, there is a need to gain ...

**Chalcogenide Perovskites: Tantalizing Prospects, ...**

Chalcogenide perovskites have recently emerged into the spotlight as highly robust, earth abundant, and nontoxic candidates for various energy conversion applications, not least photovoltaics (PV). Now, a serious ...





### (PDF) Chalcogenide Perovskite $\text{EuHfS}_3$ with Low Band Gap and

The result obtained indicates that chalcogenide perovskites  $\text{BaZrS}_3\text{-xSex}$  are good candidates for future photovoltaic applications such as tandem solar cells. [View Show abstract](#)



### Chalcogenide perovskites for photovoltaic applications: a review

Owing to promising optical and electrical properties and better thermal and aqueous stability, chalcogenide perovskites have shown a wide range of applications. Chalcogenides belong to the 16th group of periodic tables and could be potential materials for the fabrication of efficient and stable (chalcogenide perovskite) solar cells. Generally, metal halide ...



### Chalcogenides in Perovskite Solar Cells with a ...

1 ??· Perovskite solar cells (PSCs) have been on the forefront of advanced research for over a decade, achieving constantly increasing power conversion efficiencies (PCEs), while their route towards commercialization is currently ...



### Chalcogenide perovskites for photovoltaic applications: a review

Chalcogenide perovskite materials came into the picture of photovoltaic technology since 2015. Their admirable structural, electronic and optical properties make them highly





### [Piezoelectricity in chalcogenide perovskites](#)

The lead-free chalcogenide perovskite BaZrS<sub>3</sub> is shown to exhibit piezoelectricity. The loosely packed structure of BaZrS<sub>3</sub> allows for an extended displacement of the ions, resulting in symmetry

### **A review of chalcogenide-based perovskites as the next novel ...**

Chalcogenide perovskites (CPs) have garnered considerable interest in the fields of optoelectronics and photovoltaics because of their exceptional ability to withstand defects [79]. Due to this feature, they are strong prospects for a wide range of technological applications since their electrical and optical properties are largely unaffected by structural flaws or contaminants.



### **Chalcogenide Perovskite, An Emerging Photovoltaic Material: ...**

Chalcogenide perovskite materials came into the picture of photovoltaic technology since 2015. Their admirable structural, electronic and optical properties make them highly

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Chalcogenide perovskite materials are anticipated to have favourable structural, optical and electronic characteristics for solar energy conversion, yet experimental



### High-throughput screening of chalcogenide single perovskites by ...

An organic-inorganic lead halide perovskite  $\text{CH}_3\text{NH}_3\text{PbI}_3$  that sparked interest in 2009 when it was first adopted as a solar cell absorber by Kojima et al [1], represents the forefront of materials innovation for photovoltaic applications. Within less than ten years, the

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