

Are metal halide perovskites suitable for light-emitting applications?

You have full access to this article via your institution. Metal halide perovskites have shown promising optoelectronic properties suitable for light-emitting applications. The development of perovskite light-emitting diodes (PeLEDs) has progressed rapidly over the past several years, reaching high external quantum efficiencies of over 20%.

What are lead halide perovskite semiconductors?

Lead halide perovskite semiconductors first gained prominence in photovoltaic technology, where they demonstrated impressive photon-to-electron conversion efficiencies in solution-processed devices...

Can lead halide perovskite improve solar cell performance?

The photovoltaics of organic-inorganic lead halide perovskite materials have shown rapid improvements in solar cell performance, surpassing the top efficiency of semiconductor compounds such as CdTe and CIGS (copper indium gallium selenide) used in solar cells in just about a decade.

Are halide perovskites a good photovoltaic material?

Outstanding photovoltaic (PV) materials combine a set of advantageous properties including large optical absorption and high charge carrier mobility, facilitated by small effective masses. Halide perovskites ( $ABX_3$ , where  $X = I, Br, \text{or } Cl$ ) are among the most promising PV materials.

What are metal halide perovskite-based optoelectronic devices?

As a revolutionary semiconductor, metal halide perovskite-based optoelectronic devices have enabled competitive device performance compared with that of commercialized rivals, including solar cells (SCs), light-emitting diodes (LEDs), and photodetectors (PDs).

What are perovskite solar cells & light-emitting diodes used for?

Their unique optical and electrical properties render them with great potential for applications in photovoltaics, light-emitting diodes, lasers and photodetectors. The highest power conversion efficiency of 25.5% and external quantum efficiency of over 20% have been demonstrated for perovskite solar cells and light-emitting diodes, respectively.

Metal halide perovskites (MHPs), emerging as innovative and promising semiconductor materials with prominent optoelectronic properties, has been pioneering a new era of light management (ranging from emission, absorption, modulation, to transmission) for next-generation optoelectronic technology. Notably, the exploration of fundamental characteristics ...

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Since the initial application in solar cells by Kojima et al. in 2009 [1], organic-inorganic lead halide perovskites have become the star materials in the photovoltaic field during the past years. With the unique optoelectronic properties and low-cost solution process ability [2], [3], [4], perovskites are found to be an outstanding candidate for a lot of ...

Book Abstract: Real insight from leading experts in the field into the causes of the unique photovoltaic performance of perovskite solar cells, describing the fundamentals of perovskite materials and device architectures. The authors cover materials research and development, device fabrication and engineering methodologies, as well as current knowledge extending ...

Metal halide perovskites offer the potential for high-efficiency, low-fabrication-cost solar cells. This study now explores their prospects if deployed in concentrator photovoltaics and finds they ...

1 Introduction. Luminescence is a critical property that must be maximized to reach the theoretical limits of a variety of optoelectronic applications including photovoltaic solar cells (PVs) and photonic devices such as light-emitting diodes (LEDs) and lasers. 1 In a PV device, any nonradiative recombination resulting from parasitic relaxation pathways of excited carriers will ...

Hybrid lead halide perovskites have attracted intense research activity following their first implementation as light absorbers in thin-film solar cells 1 that now reach power conversion efficiencies (PCEs) in excess of 20% (refs 2, 3 ).

Organic-inorganic metal halide perovskites are demonstrated to be promising materials in a variety of optoelectronic applications including photodetection, energy harvesting, and light-emitting devices. As perovskite solar cells are well studied in literature, here, the recent developments of organic-inorganic metal halide perovskite materials ...

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Semantic Scholar extracted view of &quot;An overview of rare earth coupled lead halide perovskite and its application in photovoltaics and light emitting devices&quot; by Yihua Chen et al. ... Organic-inorganic lead halide based perovskite solar cells are considered as one of the most promising third generation photovoltaic technologies, ...

Summary &lt;p&gt;This chapter reviews the progress toward perovskite light& #x2010;emitting diodes (LEDs), highlighting the importance of developing high photoluminescence quantum yield (PLQY) perovskite materials and their incorporation into optimized multilayer light& #x2010;emitting devices. As for perovskite

solar cells, the embodiment and materials of perovskite LEDs are ...

Figure 1. The development of organic-inorganic metal halide hybrids over the years. From the discovery of 2D structure containing  $\sim 100$  or  $\sim 110$  layers to the synthesis of colloidal nanoparticles, nanoplatelets, nanowires, chalcogenide, and double perovskites, the metal halide hybrids show promise in a variety of optoelectronic applications, e.g. photovoltaic ...

This Review discusses recent developments in photovoltaic and light-emitting optoelectronic devices made from metal-halide perovskite materials. Metal-halide perovskites are crystalline materials ...

Nowadays, the soar of photovoltaic performance of perovskite solar cells has set off a fever in the study of metal halide perovskite materials. The excellent optoelectronic properties and defect tolerance feature allow metal halide perovskite to be employed in a wide variety of applications. This article provides a holistic review over the current progress and future ...

Halide Perovskite Light-Emitting Diode Technologies. Kangyu Ji, Kangyu Ji. Cavendish Laboratory, University of Cambridge, 19 JJ Thomson Avenue, Cambridge, CB3 0HE UK. ... 3.1 Device Stability. While perovskite solar cells retain  $>95\%$  of their efficiency after 1000 h under continuous solar illumination at  $60 \pm 1^\circ\text{C}$ , ...

Halide perovskites have attracted tremendous attention from many researchers recently, particularly for their excellent optoelectronic properties in applications such as photovoltaic solar cells and light-emitting diodes. In recent years, the application of halide perovskites has rapidly extended into nanoelectronics, such as thermoelectric, memory, and ...

1 INTRODUCTION. In recent years, the lead-halide perovskites have attracted great interests in the field of optoelectronics, such as photovoltaic solar cells, light-emitting devices (LEDs), photodetectors, lasers, photocatalysis and so ...

Halide perovskite materials and devices - Volume 45 Issue 6. Halide perovskites have attracted tremendous attention from many researchers recently, particularly for their excellent optoelectronic properties in applications such as photovoltaic solar cells and light-emitting diodes.

Light emitting diodes (LEDs) have become part of numerous electrical and electronic systems such as lighting, displays, status indicator lamps and wearable electronics. Owing to their excellent optoelectronic properties and deposition via simple solution process, metal halide perovskites possess unique potential for developing halide perovskite-based ...

Metal halide perovskites, which have led to great advances in photovoltaic devices, have also proved to be promising candidates for light-emitting diodes (LEDs) 1.They have shown excellent ...

The photovoltaics of organic-inorganic lead halide perovskite materials have shown rapid improvements in solar cell performance, surpassing the top efficiency of semiconductor compounds such as CdTe and CIGS (copper indium gallium selenide) used in solar cells in just about a decade. Perovskite preparation via simple and inexpensive solution processes ...

The broader application of this air-tolerant, cost-effective, easily-prepared, highly-active and band-tunable lead halide perovskites may be of a revolutionary breakthrough in the photocatalysis of organic reactions. Commercial reagents were purchased from Sigma Aldrich and TCI America. Additionally, aldehydes were distilled prior to use.

Currently, hybrid organic-inorganic perovskites (HOIPs) have been dynamically investigated for the potential applications in solar cells, 1 light-emitting diodes, 2, 3 photodetectors, 2,3 lasers 4 ...

1 Introduction. Halide perovskites promise exceptional performance in optoelectronic applications ranging from inexpensive, high-performance photovoltaic (PV) modules [1-6] to light-emitting and lasing devices. [7-9] These perovskites display a rare combination of properties including pronounced optical absorption in conjunction with relatively ...

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