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专题评述

量子点太阳电池的探索

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摘要:

阐述了探索量子点太阳电池的重要意义与物理构想, 简要介绍了两种不同结构组态的量子点太阳电池的光伏性能, 如p--i--n量子点太阳电池和量子点敏化太阳电池. 对发生在各种量子点(PbSe、PbS、PbTe、CdSe和Si)中的因碰撞电离而导致的多激子产生效应及其研究进展进行了重点评述, 并提出了设计与制作量子点太阳电池的若干技术对策. 可以预期, 具有超高能量转换效率、低制作成本与高可靠性的量子点太阳电池的实现, 有可能对未来的光伏技术与产业产生革命性的影响.

关键词: 无机非金属材料 量子点结构 综述 多激子产生 太阳电池 技术对策

Approach to quantum dot solar cells

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Abstract:

The importance and physical conception to achieve quantum dot solar cells are expounded, and the photovoltaic performances of two configuration quantum dot solar cells are described, such as p–i–n quantum dot solar cells and quantum dot–sensitized solar cells. The multiple exciton generation in various quantum dots based on impact ionization and their studied progress are reviewed. Finally, some technology strategy to design and fabricate quantum dot solar cells was proposed. It can be predicated that the achievement of the quantum dot solar cells with ultrahigh energy conversion efficiency, low fabricated cost and high stability shall create revolutionary influence for futural photovoltaic technology and industry.

Keywords: inorganic non--metallic materials quantum dot structures reviews multiple exciton generation solar cells technology strategy

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