Silicon Photovoltaic Cells and Sustainable Development

Heath et al. review the status of end-of of-life management of silicon solar modules and recommend research and development priorities to facilitate material recovery and recycling of solar...

Solar photovoltaic (PV) installations, which enable carbon neutrality, are expected to surge in the coming decades. This growth will support sustainable development goals (SDGs) via reductions in power-generation-related environmental emissions and water consumption while generating new jobs. However, where and to what extent PVs should be ...

This paper provides a comprehensive assessment of the current life-cycle sustainability status of crystalline-based photovoltaic (PV) systems. Specifically, single-crystalline Si (sc-Si) and multicrystalline Si (mc-Si) PV ...

The increasing importance of clean energy as a replacement for depleting nonrenewable resources like fossil fuels has resulted in exceptional demands for energy-collecting systems based on renewable energy sources [1, 2] anic photovoltaic (OPV) cells hold the promise of providing energy to support the Internet of Things (IoT) ecosystem smart ...

At present, the global photovoltaic (PV) market is dominated by crystalline silicon (c-Si) solar cell technology, and silicon heterojunction solar (SHJ) cells have been developed rapidly after the concept was proposed, which is one of the most promising technologies for the next generation of passivating contact solar cells, using a c-Si substrate ...

Silicon-based cells are explored for their enduring relevance and recent innovations in crystalline structures. Organic photovoltaic cells are examined for their flexibility and potential for low-cost production, while perovskites are highlighted for their remarkable efficiency gains and ...

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Therefore, the recovery of valuable materials from photovoltaic waste can be considered as a new generation of sustainable mining that keeps valuable materials in circulation, mitigating material depletion. 20 However, the most valuable components of waste solar panels are the materials in the photovoltaic cells and busbars which include silver, copper, and silicon.

Recycling solar photovoltaic panels to recover materials, especially silicon, is a critical sustainability challenge. Recovering materials from waste for use in manufacturing new ...

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The mass deployment of solar energy technology has been inspired by sustainable energy objectives. However, end-of-life solar photovoltaic modules present the growing dilemma of solar waste managem...

International Trade Commission Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products.(Accessed 10/30/2021) (2021). Mineral Commodity Summaries. (U ...

At present, silicon is the only semiconducting material that can clearly sustain the growth of PV into the range of terawatts per year, as needed to make a substantial ...

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Recent advancements in silicon heterojunction solar cells and the development of carrier-selective contacts have shown promising results in enhancing the efficiency of photovoltaic cells . Furthermore, research into hybrid polymer semiconductor materials has shed light on their photon absorption and exciton generation capabilities. While these materials ...

In order to effectively address these issues and reduce the impact of end-of-life photovoltaic modules on ecological environment quality and industry sustainable development, ...

This study provides an overview of the current state of silicon-based photovoltaic technology, the direction of further development and some market trends to help interested stakeholders make decisions about investing ...

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