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Benefits of solar photovoltaic energy generation outweigh the costs, according to new research from the MIT Energy Initiative. Over a seven-year period, decline in PV costs outpaced decline in value; by 2017, market, health, and climate benefits outweighed the cost of ...

This Perspective introduces the Harvard Clean Energy Project (CEP), a theory-driven search for the next generation of organic solar cell materials. We give a broad overview of its setup and infrastructure, present first results, and outline upcoming developments. CEP has established an automated, high-throughput, in silico framework to study potential candidate ...

An integrative spatial model was developed to evaluate the technical potential of solar photovoltaic power. The influence of impacting factors was quantified systematically on an hourly basis. Results suggest that the electricity potential for the BRI region reaches 448.9 PWh annually, 41.3 times the regional demand for electricity in 2016 ...

Harvard organic photovoltaic 15 dataset (HOPV15). It was found that the neural-based. models generally performed better on the computational dataset with the attentive FP.

The Harvard Clean Energy Project was conceived in 2008 to help find materials to make this exciting technology a reality! The sun is an abundant source of energy and Earth receives ...

Nanowires bring new possibilities to the field of hot-carrier photovoltaics by providing flexibility in combining materials for band engineering and using nanophotonic effects to control light absorption. Previously, an open-circuit voltage beyond the Shockley-Queisser limit was demonstrated in hot-carrier devices based on InAs-InP-InAs ...

The virtual high-throughput screening framework of the Harvard Clean Energy Project allows for the computational assessment of candidate structures for organic electronic materials - in ...

Solar Cells: Costs, Challenges, and Design. Over the past 20 years, the costs associated with solar cells, the structures capable of converting light energy into electricity, have been steadily decreasing. The National Renewable Energy Laboratory, a US government lab that studies solar cell technology, estimates contributors to the increasing ...

Solar cells, also known as photovoltaic cells, convert the sun"s energy into electricity. This works through a process known as the photoelectric effect: when photons that radiate from the sun hit the silicon atoms of the solar ...

The Harvard Organic Photovoltaic Dataset (HOPV15) presented in this work is a collation of experimental photovoltaic data from the literature, and corresponding quantum-chemical calculations performed over a

range of geometries, each with quantum chemical results using a variety of density functionals and basis sets. It is anticipated that this ...

Abstract: As the world"s largest CO 2 emitter, China"s ability to decarbonize its energy system strongly affects the prospect of achieving the 1.5 °C limit in global, average surface-temperature rise. Understanding technically feasible, cost-competitive, and grid-compatible solar photovoltaic (PV) power potentials spatiotemporally is critical for China"s ...

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The Harvard Organic Photovoltaic Dataset (HOPV15) presented in this work is a collation of experimental photovoltaic data from the literature, and corresponding quantum-chemical calculations performed over a range of conformers, each with quantum chemical results using a variety of density functionals and basis sets. It is anticipated that this dataset will be of use in ...

The Harvard organic photovoltaic dataset. Sci. Data 3, 160086 (2016). Article Google Scholar Scharber, M. C. et al. Design rules for donors in bulk-heterojunction solar cells--towards 10% ...

Transparent photovoltaics (PVs) provide a potentially facile route to building-integrated PVs and seamless energy-harvesting within non-window surfaces such as electronic displays, autonomously powered electronic-glazings, and mobile-electronic accessories. Such devices have been enabled by manipulation of excitons in organic and molecular semiconductors that ...

We present the Harvard Clean Energy Project (CEP) which is concerned with the computational screening and design of new organic photovoltaic materials. CEP has established an automated, high-throughput, in silico framework to study millions of potential candidate structures. This presentation discusses the CEP branch which employs first-principles computational quantum ...

Indoor photovoltaics has received much interest lately due to its applications in the daily human life in the small scale device applications like Internet of things, human-interactive machines based actuators, wireless sensors to name a few. Nevertheless, these devices possess light weight, low cost, less power for charging and environmental friendliness leads appropriate ...

Solar Photovoltaics (PV) is a vital source of energy in meeting the world"s increasing energy needs. It is abundant, clean, environmentally friendly, and becoming cheaper and more efficient with increased research. Consequently, there is a notable increase in solar panel installations worldwide. Considering the average lifetime of solar panels of about 25 years, and increasing ...

Abstract. Organic solar cells are one of the promising approaches to ubiquitously establishing renewable energy sources; alas the necessary 10% energy conversion efficiency remains elusive.

This paper reviews the recent research progress in the incorporation of plasmonic nanostructures with photovoltaic devices and the potential for surface plasmon enhanced absorption. We first outline a variety of cell architectures incorporating metal nanostructures. We then review the experimental fabrication methods and measurements to date, as well as systematic theoretical ...

This Perspective introduces the Harvard Clean Energy Project (CEP), a theory-driven search for the next generation of organic solar cell materials. We give a broad overview ...

The Harvard Clean Energy Project: Large-Scale Computational Screening and Design of Organic Photovoltaics on the World Community Grid ... Organic solar cells are one of the promising approaches to ...

An ensemble deep neural network architecture, called SINet, is presented, which harnesses both the SMILES and InChI molecular representations to predict HOMO values and leverage the potential of transfer learning from a sizeable DFT-computed dataset- Harvard CEP to build more robust predictive models for relatively smaller HOPV datasets.

Thin film solar cells are based on various materials such as cadmium telluride (CdTe), copper indium gallium diselenide (CIGS), and amorphous thin film silicon (a-Si, TF-Si) are commercially used in several conventional and advanced technologies. Categories. ... Harvard Book Store 1256 Massachusetts Avenue Cambridge, MA 02138. Tel (617) 661-1515

The virtual high-throughput screening framework of the Harvard Clean Energy Project allows for the computational assessment of candidate structures for organic electronic materials - in ...

An integrative spatial model was developed to evaluate the technical potential of solar photovoltaic power. The influence of impacting factors was quantified systematically on an hourly basis. Results suggest that the electricity potential for the BRI region reaches 448.9 PWh annually, 41.3 times the regional demand for electricity in 2016.

The Aspuru-Guzik group at Harvard conceived of and implemented the Clean Energy Project (CEP). It is a theory-driven search for the next generation of organic solar cell materials. CEP has established an automated, high-throughput, in silico framework to study potential candidate structures for organic photovoltaics.

The Weld Hill Solar Project, currently underway, is the Arnold Arboretum"s third and largest solar project and Harvard"s most ambitious sustainability initiative to date, with nearly 1,300 solar panels powering a ...

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