# Dielectric in solar cells

Do dielectric properties affect photovoltaic efficiencies in organic solar cells?
The fill factor (FF) of organic solar cells (OSCs), a critically important photovoltaic parameter, is still sub-optimal, often less than 0.8. To further reduce the FF gaps with regard to the Shockley-Queisser upper limit, we present a study unveiling the impacts of dielectric properties on obtaining high FFs and photovoltaic efficiencies in OSCs.

Is a dielectric-screening effect enabled by controlling space charge?
Here,we report a dielectric-screening effect enabledby controlling the space charge within formamidinium-cesium lead halide perovskites,and for the first time,we provide a coherent picture coupling the screening effect and device performance.

What is dielectric constant?
Note that here we only discuss electrons for simplicity,but the same principle applies to holes. The dielectric constant is the ratio of the permittivity of a substance to the permittivity of vacuum. It describes the degree to which materials can contain an electric flux and is also frequency dependent.

Does dielectric response affect defect capturing probability?
Here,we demonstrate that the defect capturing probability estimated by the capture cross-section is decreasedby varying the dielectric response,producing the dielectric screening effect in the perovskite. The resulting perovskites also show reduced surface recombination and a weaker electron-phonon coupling.

Why do perovskite films have a dielectric-screening effect?
Changes in the dielectric responses of the perovskite films lead to a substantial variation of Coulomb interactions and defect capture cross-sections, thereby producing a dielectric-screening effect.

How does dielectric constant affect defect screening?
Changes in the localized electric fieldsby the variation in the dielectric constant will lead to defect screening,which can mitigate the adverse effects of pristine unoccupied defects in the films.

Cost-effective and lightweight solar cells are currently demanded in strategic fields such as space applications or integrated-wearable devices. A reduction of the active layer thickness ...

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Stability and scalability are essential and urgent requirements for the commercialization of perovskite solar cells (PSCs), which are retarded by the non-ideal interface leading to non-radiative recombination and degradation. Extensive efforts are devoted to reducing the defects at the perovskite surface.

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We present that light absorption in organic solar cells (OSCs) can be significantly enhanced by a front-sided incorporation of a core-shell nanostructure consisting ...

Organic-inorganic lead trihalide perovskites have emerged as an outstanding photovoltaic material that demonstrated a high 17.9% conversion efficiency of sunlight to electricity in a short time.

Scientific Reports - Enhanced efficiency of carbon based all perovskite tandem solar cells via cubic plasmonic metallic nanoparticles with dielectric nano shells Skip to main content Thank you for ...

The potential of CsGeI 3 as a solar cell material is assessed based on its intrinsic properties. We find anomalously large Born effective charges and a large static dielectric constant dominated by lattice polarization, which should reduce carrier scattering, trapping, and recombination by screening charged defects and impurities.

The plasmonic properties of nanoparticles (NPs) such as silver (Ag) can be improved by utilizing core-shell materials in order to improve photon harvest in organic solar cells (OSCs). In this work, we utilized four dielectric materials, namely TiO $$_2$$ 2, SnO $$_2$$ 2, ZnO, and SiO $$_2$$ 2, to improve the near-field and far-field enhancement in addition to ...

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