Transparent Solar Cells

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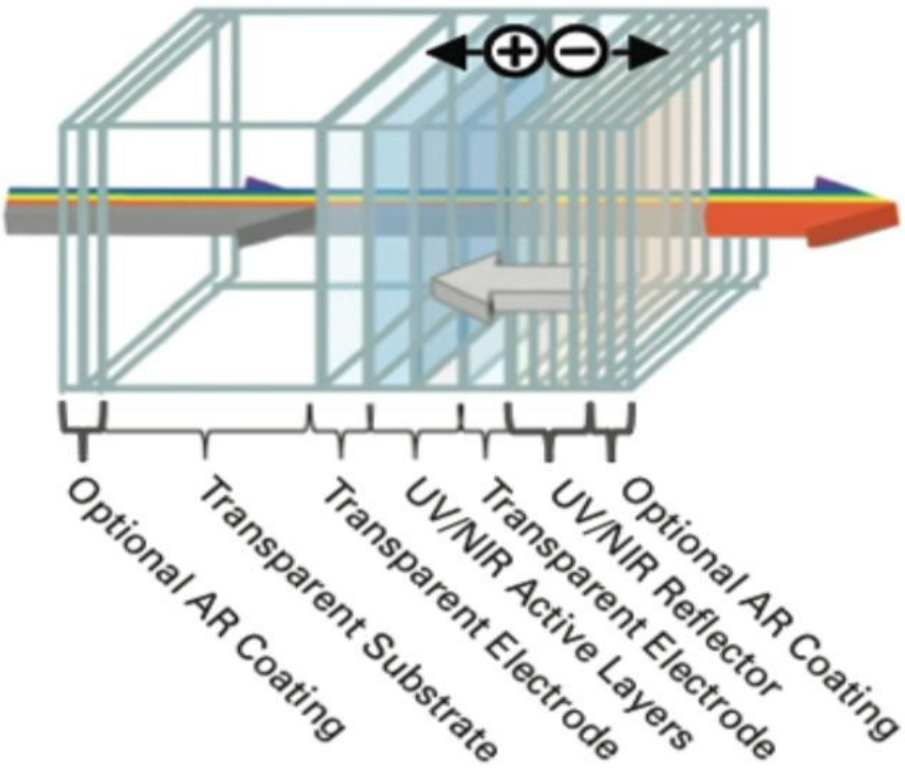
Abstract

Recently, climate change which is a result of using fossil fuels is a major issue for the world. It can be resolved using various renewable energy sources wherein solar energy is the cleanest and most potentially available resource. It has the capacity to meet high energy demands using solar cells that convert solar energy into electricity by absorbing photons of light that generate a large number of electrons which flow through the circuit thereby producing electricity. Presently this is achieved using solar panels which require large space (land and roof top). This problem can be solved using concept of Transparent Solar Cell (TSC) that can convert any sheet of glass into an energy producing source. They provide power by absorbing and utilizing unwanted light energy through windows in buildings and automobiles leading to an efficient use of architectural space. TSC allows absorption of entire spectrum of light except visible light hence achieving both appropriate transparency and efficiency. TSC is made by coating of glass, plastic or any transparent substrate where active material is sandwiched between transparent electrodes which are connected to an external circuit. Anti-reflecting is also used sometimes to maximize incoming light by reducing reflections. TSC can be applied on any glass object without disturbing its appearance as it is invisible. Due to its useful properties, TSC can be used in buildings, mobile screens, car windows, trains, boats, etc.

Diagram of Transparent solar Glass



This schematic diagram shows the key components in the novel transparent photovoltaic (PV) device, which transmits visible light while capturing ultraviolet (UV) and near-infrared (NIR) light. The PV coating—the series of thin layers at the right—is deposited on the piece of glass, plastic, or other transparent substrate. At the core of the coating are the active layers, which absorb the UV and NIR light and cause current to flow via the two transparent electrodes through an external circuit. The reflector sends UV and NIR light back into the active layers, while the anti-reflective (AR) coatings on the outside surfaces maximize incoming light by reducing reflections.

Innovative idea:

TSCs can be of great help for fulfilling energy requirements in future but the existing glasses that already cover a large surface area also need to be utilized. It is not possible to replace all the existing glasses with TSC Glass. For that purpose, separate sheets can be produced which behave as solar cells and that can be directly applied on the existing glasses. This will be both cost effective and less laborious.

Keywords:

Transparent photovoltaic

Renewable energy

Transparent semiconductors

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