Transparent Solar Panels

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Abstract— Imagine a world where we could generate electricity using the surface of our windows, smartphones, our car's sun roof or the glass roof of our office building. What sounds like a far-away dream, is on its way to become reality thanks to transparent solar panels.
Conventional solar panels, more specifically solar photovoltaic panels, absorb sunlight and convert photons (particles of sunlight) into usable energy. The difficulty with making transparent solar panels is that the sunlight passes through the transparent material. This means that the process that generates the electricity in the solar cell can not be started because no light is absorbed. This article presents two interesting attempts to overcome this obstacle: partially transparent panels and fully transparent panels employing organic salts

Index Terms— Conventional solar panels ,Solar photovoltaic panels , partially transparent panels , fully transparent panelsemploying organic salts, transparent material ,electricit*y*

1 Introduction

Transparent solar cells that could turn everyday products such as windows and electronic devices into power generators—without altering how they look or function today. How? Their new solar cells absorb only infrared and ultraviolet light. Visible light passes through the cells unimpeded, so our eyes don't know they're there. Using simple room-temperature methods, the researchers have deposited coatings of their solar cells on various materials and have used them to run electronic displays using ambient light. They estimate that using coated windows in a skyscraper could provide more than a quarter of the building's energy needs without changing its look. They're now beginning to integrate their solar cells into consumer products, including mobile device displays.
Photovoltaic glass is probably the most cutting-edge new solar panel technology that promises to be a game-changer in expanding the scope of solar. These are transparent solar panels that can literally generate electricity from windows—in offices, homes, car's sunroof, or even smartphones. Blinds are another part of a building's window that can generate electricity (we will discuss it in a later section).
Researchers at Michigan State University (MSU) originally created the first fully transparent solar concentrator in 2014. This clear solar panel could turn virtually any glass sheet or window into a PV cell. By 2020, the researchers in the U.S. and Europe have already achieved full transparency for the solar glass.
These transparent solar panels can be easily deployed in a variety of settings, ranging from skyscrapers with large windows to a mobile device such as a phone, a laptop, or an e-reader. As these solar power windows can simply replace the traditional glass windows in offices and homes, the technology holds the potential to virtually turn every building in the United States and the world into a solar producer.

Problem Statement

To make a Alternative to Conventional Solar cell

III. Objective

To make a Alternative to Conventional Solar cell
To discover a new Cost Efficient Energy source

IV. Scope

The potential to generate renewable, clean energy from the sun is enormous with transparent solar panels, considering the number of skyscrapers and buildings already in existence or under construction with a massive amount of glass surface .

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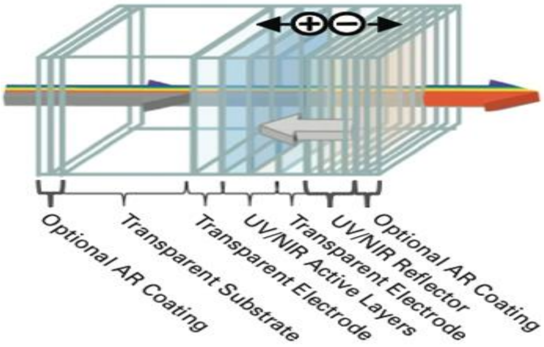

This schematic diagram shows the key components in the novel transparent photovoltaic (PV) device, which transmits visible light while capturing ultraviolet (UV) and near-infrared (NIR) light. The PV coating—the series of thin layers at the right—is deposited on the piece of glass, plastic, or other 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.

. EXPECTED OUTCOMES

The potential to generate renewable, clean energy from the sun is enormous with transparent solar panels, considering the number of skyscrapers and buildings already in existence or under construction with a massive amount of glass surface .

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METHODOLOGY

A transparent PV cell. The schematic figure below shows its components and how they work together. The thickest layer (toward the left) is the glass, plastic, or other transparent substrate being coated; the multiple layers of the PV coating are toward the right. At the core of the coating are the two active layers—the absorptive semiconductor materials that get excited by sunlight and interact, creating an electric field that causes current to flow. Sandwiching those layers are electrodes that connect to the external circuit that carries the current out of the device. Since both electrodes must be transparent—not the usual reflective metal—a layer on the back of the cell can be added to reflect sunlight of selected wavelengths, sending it back for a second pass through the active layers. Finally, anti-reflective coatings can be used on both outside surfaces to reduce reflections because any light that reflects—potentially as much as 10% of the total—doesn't go through the device. "We use a combination of molecular engineering, optical design, and device optimization—a holistic approach to designing the transparent device," says Barr.

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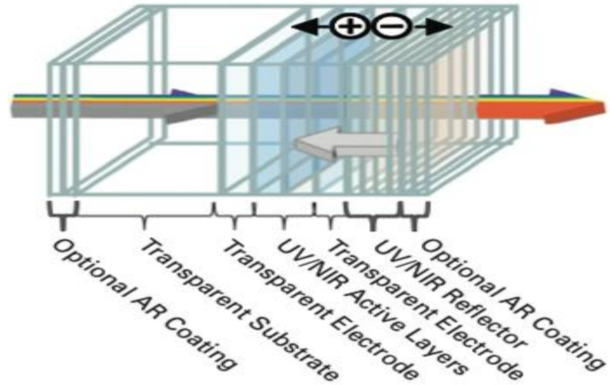

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To demonstrate the operation of their solar cell, the researchers measured its absorptive response and then compared it with that of a conventional solar cell. The results appear below. In each case, the absorptive response (black curve) is superimposed on the solar spectrum (gray curve). In the conventional cell (top), the wavelengths at which absorption is relatively high include the visible part of the spectrum that our eyes can detect (the colored section between about 400 and 700 nanometers). In contrast, the transparent cell (bottom) absorbs well in the near-infrared and the ultraviolet parts of the spectrum—both above and below the visible range. But in the visible region, absorption drops off, approaching zero.

VIII. CONCLUSION

NOWADAYS RENEWABLES, SPECIFICALLY WIND AND PHOTOVOLTAIC, ARE CHEAPER THAN CONVENTIONAL ENERGIES IN MUCH OF THE WORLD.THE MAIN RENEWABLE TECHNOLOGIES – SUCH AS WIND AND SOLAR PHOTOVOLTAIC– ARE DRASTICALLY REDUCING THEIR COSTS, SUCH THATTHEY ARE FULLY COMPETITIVE WITH CONVENTIONAL SOURCES IN A GROWING NUMBER OF LOCATIONS.ECONOMIES OF SCALE AND INNOVATION ARE ALREADY RESULTING IN RENEWABLE ENERGIES BECOMING THE MOST SUSTAINABLE SOLUTION, NOT ONLY ENVIRONMENTALLY BUT ALSO ECONOMICALLY, FOR POWERING THE WORLD. SOLAR ENERGY DOES NOT EMIT TOXIC SUBSTANCES OR CONTAMINANTS INTO THE AIR, WHICH CAN BE VERY DAMAGING TO THE ENVIRONMENT AND TO HUMAN BEINGS. TOXIC SUBSTANCES CAN ACIDIFY LAND AND WATER ECOSYSTEMS, AND CORRODE BUILDINGS. AIR

CONTAMINANTS CAN TRIGGER HEART DISEASE, CANCER AND RESPIRATORY DISEASES LIKE ASTHMA.SOLAR ENERGY DOES NOT GENERATE WASTE OR CONTAMINATE WATER—AN EXTREMELY IMPORTANT FACTOR GIVEN THE SCARCITY OF WATER. UNLIKE FOSSIL FUELS AND NUCLEAR POWER PLANTS, WIND ENERGY HAS ONE OF THE LOWEST WATER-CONSUMPTION FOOTPRINTS, WHICH MAKES IT A KEY FOR CONSERVING HYDROLOGICAL RESOURE

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