Transparent solar cells for windows that generate electricity

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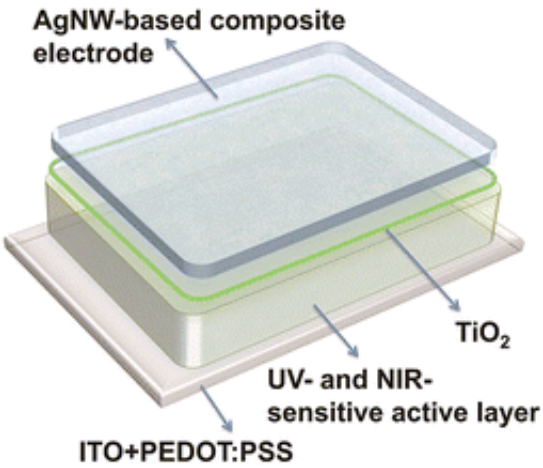

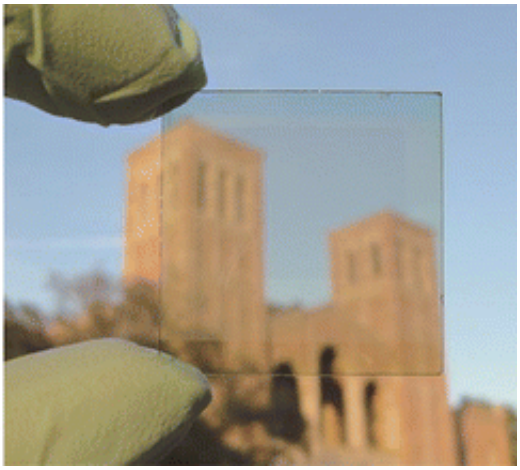

Scientists are reporting development of a new transparent solar cell, an advance toward giving windows in homes and other buildings the ability to generate electricity while still allowing people to see outside. Their report appears in the journal *ACS Nano*.

Yang Yang, Rui Zhu, Paul S. Weiss and colleagues explain that there has been intense world-wide interest in so-called polymer solar cells (PSCs), which are made from plastic-like materials. PSCs are lightweight and flexible and can be produced in high volume at low cost. That interest extends to producing transparent PSCs. However, previous versions of transparent PSCs have had many disadvantages, which the team set out

to correct.

They describe a new kind of PSC that produces energy by absorbing mainly infrared light, not visible light, making the cells 66 percent transparent to the human eye. They made the device from a photoactive plastic that converts infrared light into an electrical current. Another breakthrough is the transparent conductor made of a mixture of silver nanowire and titanium dioxide nanoparticles, which was able to replace the opaque metal electrode used in the past. This composite electrode also allowed the solar cell to be fabricated economically by solution processing. The authors suggest the panels could be used in smart windows or portable electronics.

More information: "Visibly Transparent Polymer Solar Cells Produced by Solution Processing" *ACS Nano*, Article ASAP. DOI: 10.1021/nn3029327

Abstract
Visibly transparent photovoltaic devices can open photovoltaic applications in many areas, such as building-integrated photovoltaics or integrated photovoltaic chargers for portable electronics. We demonstrate high-performance, visibly transparent polymer solar cells fabricated via solution processing. The photoactive layer of these visibly transparent polymer solar cells harvests solar energy from the near-infrared region while being less sensitive to visible photons. The top transparent electrode employs a highly transparent silver nanowire–metal oxide composite conducting film, which is coated through mild solution processes. With this combination, we have achieved 4% power-conversion efficiency for solution-processed and visibly transparent polymer solar cells. The optimized devices have a maximum transparency of 66% at 550 nm.

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