Solar Powered Everything!

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I've heard for years that "soon we'll have solar panels on everything." To be honest, I've never paid much attention to the hype because these magical solar panels that can fit on and inside everything never seemed to materialize commercially, or if they did they were always way too expensive for the everyday consumer, or maybe just for me. But researchers at Stanford University seem to have made a real breakthrough in solar technology: thin, sticky, flexible solar panels that can stick to just about any surface or object imaginable.

Solar panels are nothing new. The ability to produce electricity directly from the sun's rays via the photovoltaic effect has been around for over half a century. Since their invention, strides have been made in cost reduction and efficiency improvement, but certain factors continue to hold them back from being used by the public in everyday usage. Besides cost, which unfortunately is still too high for most people to see a return on investment in a reasonable amount of time, the other big obstacle is rigidity. Rigidity is fine for things like a solar power plant or a space station, but it doesn't work for everything.

Most commercially available solar panels are still manufactured the same way they have been for decades. To put it overly simply and quite boringly, crystalline silicon discs are doped with boron and phosphorous and bonded to metal conductors to create a solar cell. The manufacturing process usually involves creating the solar cells on a rigid surface, such as glass, to have the highest quality and electrical efficiency. In order to get away from the limitations of rigid solar panels, flexible solar panels were developed in the late 1970's. Remember those solar powered calculators that started turning up everywhere in the late 1970's and early 1980's? Of course you don't, you're too young! But seriously, those had flexible solar panels in them.

However, there is a big drawback when moving from rigid to flexible solar panels: a significant loss of efficiency. Assistant Professor of Mechanical Engineering at Stanford University, Xiaolin Zheng, explained this loss of efficiency as being caused by the flexible substrate, or backing material for the cells, which can't tolerate the high temperatures and chemicals used to manufacture rigid solar panels. This forces flexible solar panel manufacturers to use different methods which decrease the efficiency of the solar cells or to use more expensive substrate materials to get similar efficiency to rigid panels.

To get around this, Zheng, who was the principal author of the original paper on this new technology published in Scientific Reports, has created a method for solar cell manufacturing that retains the best of both worlds. The new method involves fabricating the solar cell on a rigid substrate and then separating the solar cell "film" from the rigid backing with a layer of nickel and a water bath. The film, which is the actual electricity producing portion of the solar panel, is then freed to be

attached to any surface imaginable, and the rigid backing can be reused to make more solar sheets.

If this product becomes commercially available for a reasonable price, the possible uses are nearly endless. The solar stickers could be attached to buildings, windows, roofs, clothing, laptops, etc. There would be no object too small or too large. The car wrap industry would probably come out with “solar wraps” that you can roll out and stick on to your car’s exterior. I would like to see a wide brim hat for working outside that is covered in this solar tape so I could charge my iPod as I’m listening to it. How about a dog vest covered in it? Then when somebody asks why you leave your dog outside in the hot summer sun, you can say “He’s powering our home.”

This technology will drastically change the way solar power is integrated into a product. Currently the question is “Ok now where does our panel go?”, but now the question becomes “How much spare surface area do we have?”