



**RESEARCH2REALITY**

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## What's possible with solar power?

An interview on current issues with:

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### What's possible with solar power?

When you think about solar energy, well, it just lands on the ground anyway – no harmful emissions, no CO<sub>2</sub>. In one hour, more energy is hitting than all of humanity uses in a year. So the sheer volume and size of the energy that you can derive from the sun is sufficient to answer that question. When you think about the security, the economic security, the social security of humanity as a living species, as a civilization on this planet, we really need inexpensive, sustainable sources of energy.

We picture a world in which solar cells are so convenient they're on a carpet that you can roll out onto your roof, or they're on a decal that you can stick on a side of a streetcar, or you can stick on your car, you can stick on your airplane wing. We live in this world in which we're moving increasingly towards mobility. I mean, just think how far we've come in terms of communications mobility – the computing power in one of today's smart phones. That then leads us to making solar pants, solar shirts, a power suit that you can use to charge up your mobile device wherever you are.

### How can we harness the sun's energy?

You really need to figure out how, for a given area, for a square metre of solar cell, how can you make that more efficient. And the answer to doing that comes down to some pretty fascinating chemistry, physics, materials science, electrical engineering. We need to understand how light - made up of photons - becomes electrons, the unit of currency of electricity in these materials. We need to figure out how to make these even stronger absorbers of light. We need to figure out how to get these electronic charges out of the solar cell and, you know, into your electrical outlets more efficiently.

The new hotness is carbon. Make it lightweight, make it out of carbon, make it easy to mass produce and easy to scale up just like the plastics that we use all around us. We have to design them so that they behave like electronic materials which is very challenging. Most of the plastics are used as insulators, they're not conductive. The processes by which they turn light into electricity are fundamentally different than the silicon solar panels that we have today.

By using nanotechnology, we're now being able to talk about the sub-cellular machinery of life. In our solar cells, for instance we're making a lot of nanomaterials in there. We need to have that control over matter at this length scale and nanotechnology enables that.

So it's there, it's shining, so we should use it.