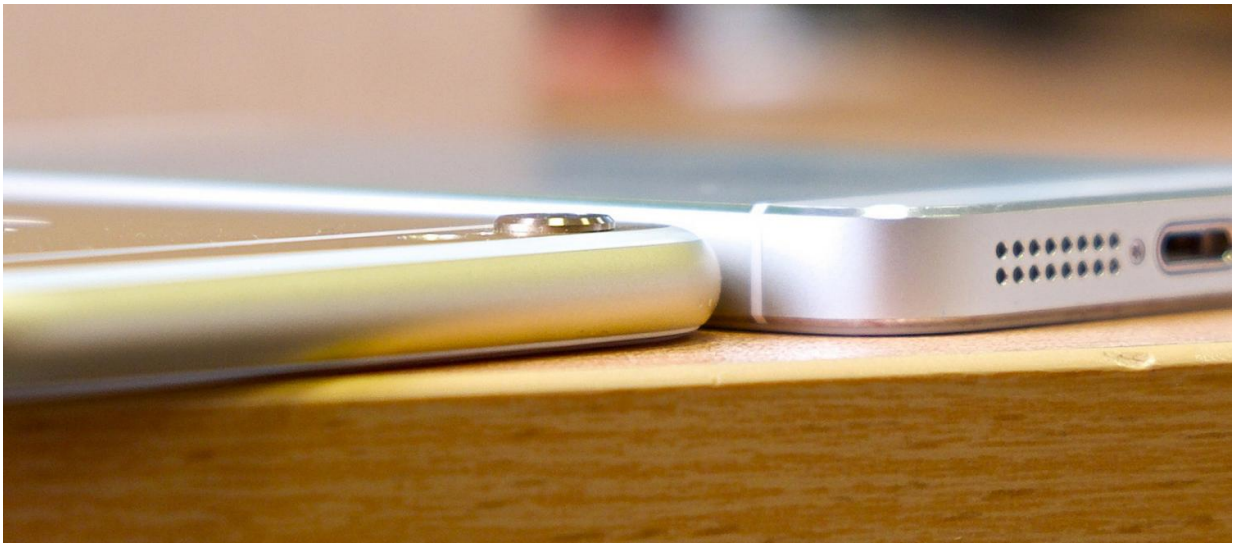


Printed solar cells thinner than your hair could power your phone

June 27 2017, by Steve Gillman, From Horizon Magazine



Nanotechnology could give us extremely thin solar panels that could power phones. Credit: Flickr/ Kārlis Dambrāns

Extremely thin printable solar panels could power your phone and are amongst a range of new ways nanotechnology is opening the door to a clean energy and waste-free future.

Nanotechnology, a science that focuses on understanding materials on an atomic scale, is helping researchers and businesses introduce new technologies that could transform our economy into a greener, less wasteful one.

"Nanotechnology as a field has an enormous role to play in moving our planet to sustainable and intelligent living," said Professor Martin Curley from Maynooth University in Ireland, speaking on 21 June at the EuroNanoForum conference, in Malta, organised by the Maltese Presidency of the Council of the European Union and co-funded by the EU.

He explained to an audience of businesspeople and researchers that nanotechnology holds the potential to spark 'an explosion of innovation'.

One area where this innovation could have its biggest impact is with how we generate, use and consume energy.

Speaking at a session dedicated to nanotechnology in [clean energy](#) generation, Prof. Alejandro Pérez-Rodríguez, from the department of electronics at the University of Barcelona, Spain, said solar energy and photovoltaic (PV) technology itself could be considered a nanotechnology sector.

"In all PV technologies and devices we put some nanotechnology ... If we want to move to devices with higher functionality, lower weight, higher flexibility, different colours, then we need to integrate more nanotechnologies into their materials and architecture."

At the same session, Artur Kupczunas, co-founder of Saule Technologies, explained how his company is using nanotechnology to print solar panels using perovskite crystals, a cheap and highly sensitive mineral that was first found in the Ural Mountains of Russia in 1839.

They produce thin layers of solar cells that are somewhere near one-tenth of the thickness of a single human hair. This innovation could greatly reduce the cost of producing solar energy while transforming any surface into a solar panel, from walls and road-side barriers to the

surface of your smartphone.

"The most interesting factor is the (reduction of) overall costs," said Kupczunas, explaining that this means the technology could be easily scaled out across the market.

Fuel cell

At the same session, John Bøgild Hansen, a senior scientist from Haldor Topsøe, a Danish chemical engineering company, explained how they have been using nanotechnology to look at the atomic level of gases in order to better understand their properties.

This knowledge contributed to creating a [fuel cell](#) for greener biofuel production. Their process extracts pure hydrogen from plant materials while reusing any CO₂ emissions created during the process to help power the production cycle, preventing any fossil fuels entering the atmosphere.

This, he believes, is a way to 'break the bottleneck' on biofuels which currently struggle to get public and private support.

"If we want the conveniences we have today from liquid energy carriers (oil, natural gas etc.) for transport ... hydrocarbons (biogas) are the best," he said.

Storing wind and solar energy during unstable weather is another gap in our sustainable energy future.

Professor Magnus Bergen and his team at Sweden's Linköping University are looking into using nanotechnology to harness the molecular properties of a plastic conductive material called PEDOT:PSS. They combine this knowledge with nanocellulose, a

product made from plants or oil, to create an organic material that stores energy.

"If we make a (PEDOT:PSS) battery the size of a refrigerator it can store (enough [energy](#) for) the needs of a family in a house or an apartment for a day," he said.

Because of its ability to charge quickly, it could be a way to compensate for the under- or over- production of wind and [solar energy](#) during calm or cloudy days. This, in turn, could break cities' dependency on [fossil fuels](#).

"You need to store when you are over-producing and release when you are under-producing," Prof. Bergen explained.

Waste-free

Nanotechnology also has the ability to make technology smaller, extend the life-cycle of electronics, improve manufacturing processes, all of which would mean less waste has to go to the landfill.

Speaking at one of the sessions, Joe Murphy, from the Ellen MacArthur Foundation, an association in the UK dedicated to promoting waste as a resource, explained nanotechnologies 'may enable us to create a new material palette' that allows future products to be recycled more easily.

"At the moment we have a lot of barriers to recycling ... [nanotechnology](#) may enable us to do more," he said.

Provided by Horizon: The EU Research & Innovation Magazine

Citation: Printed solar cells thinner than your hair could power your phone (2017, June 27)
retrieved 10 April 2024 from <https://phys.org/news/2017-06-solar-cells-thinner-hair-power.html>

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