

Photovoltaic cells are to be combined into one device with electrochemical energy storage systems

March 31 2016



The TU Graz team aims to make a battery and solar cell hybrid out of two single systems. Credit: Lunghammer - TU Graz

Whether fair weather or foul, sustainable energy supply must be

independent of natural fluctuations of renewable energy sources, such as sunshine. The coupling of "green" energy sources with reliable energy storage systems is fundamental.

"Currently, single systems of photovoltaic cells which are connected together—mostly lead-based batteries and vast amounts of cable—are in use. Solar panels on the roof with a battery in the cellar. This takes up a lot of space, needs frequent maintenance and is not optimally efficient," says Ilie Hanzu from TU Graz's Institute of Chemistry and Technology of Materials. "We want to make a battery and solar cell hybrid out of two single systems which is not only able to convert electrical energy but also store it." Hanzu and his team—in cooperation with Graz Centre for Electron Microscopy (ZFE)—are entering largely unknown scientific territory. In the SolaBat project, they want to develop a new, application-relevant concept and test its capability.

Combining new materials

The key to success lies in the new combination of functional [materials](#). Hanzu explains: "In the hybrid system, high-performance materials share their tasks in the solar cell and in the battery. We need materials that reliably fulfil their respective tasks and that are also electrochemically compatible with other materials so that they work together in one device."

Instead of environmentally damaging cobalt-containing electrodes, eco-friendly titanates will be used as the active materials. Polymer-based cells—in other words, organic [solar cells](#)—could also be used. "We have to know what happens when the materials come into contact with each other. For this reason, our project partner, the Centre for Electron Microscopy, is investigating the underlying fundamental interface effects and reactions," say Hanzu. The other three work packages of the project concentrate on materials for the photovoltaic side and the battery

side as well as the compatibility of materials and the assembly of both components into one device.

Hybrid for all

The advantages of a "two in one" hybrid system are obvious: It would be space saving, efficient and comparatively simple to manage. In the SolaBat project, the basics are being developed and tested, but even at this early stage, a variety of potential applications of such a system are on the horizon—from mobile batteries and car batteries to larger [solar panels](#). Hanzu explains: "Our preliminary work was very promising and I'm confident that at the end of SolaBat, we will be able to present a working concept of a photovoltaic battery hybrid. Where, exactly, such a system will find application is too early to say, but the possibilities are in any case manifold." Moreover, different applications have different needs. "With batteries in micro applications or small appliances, such as smartphones, space saving is primary and weight secondary. In the case of [car batteries](#), in contrast, weight is the most important parameter, space not so much."

Provided by Graz University of Technology

Citation: Photovoltaic cells are to be combined into one device with electrochemical energy storage systems (2016, March 31) retrieved 10 April 2024 from <https://phys.org/news/2016-03-photovoltaic-cells-combined-device-electrochemical.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.