

## Researchers designs a biodegradable solar cell module power source to revive green electronics

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Globally, the digitalisation of agriculture requires the increasing use of measurement electronics in farming. However, power supply and electronic waste pose problems. VTT, Europe's leading research institution has now developed a biodegradable solar cell module power source in an international green electronics research project.

The solar cell module developed by VTT is so small and light that it can be attached directly to, for example, the stem of a cultivated plant or a large leaf. The cell is approximately the size of a credit card, very flexible and extremely thin. After the growing season, the cell decomposes along with the rechargeable power supply that the cell charges.

"When a solar cell is used in an agricultural application, biodegradability is essential. In this case, there is no real harm caused if the cell cannot be removed from the field, even if it is in close contact with the soil. And, there are no harmful substances to leach into the environment or exacerbate the microplastics problem," says Maria Smolander, Research Team Leader at VTT.

"Right now, sensors still aren't being used a great deal in agriculture, but this biodegradable solution makes it possible to more effectively implement them in agricultural applications," says Smolander.

The aim of the three-year international research project is to create degradable cultivation sensors. In addition to VTT, Tampere University, University of Glasgow, Lukaszewicz Institute of Microelectronics and Photonics (Lukasiewicz-IMIF), Centre Suisse d'Electronique et de Microtechnique S.A. (CSEM) and McGill University contributed to the project, which was funded by the CHIST-ERA and national funding agencies (e.g. Research Council of Finland).

“Although agriculture has served as a practical test platform for this green electronics project, the main idea is to explore how electronics can be made more environmentally friendly,” says Liisa Hakola, Senior Scientist at VTT.

In the project, VTT developed the solar cell and Tampere University developed a battery-like supercapacitor that stores energy. The project has also developed compostable sensors and modules that transmit collected data wirelessly.

“The aim here is not to collect a large amount of energy - it’s about low energy consumption sensors that can be used to monitor the state of the environment. The degradable solar cell is not intended to match the performance of conventional cells, and there is no need for a long service life,” says Marja Väänänen, Senior Scientist at VTT