Power-generating material for organic photovoltaics

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Toyobo Co., Ltd. and the French government research institute CEA have succeeded in making trial organic photovoltaic (OPV) small cells on a glass substrate with the world's best conversion efficiency in a dim

room. The team tested OPV modules on a thin, lightweight PET (polyethylene terephthalate) film substrate during their joint research project. The trial products use a power-generating material for OPV that Toyobo has been developing.

OPVs have attracted wide attention as next-generation solar cells. Toyobo aims to put the material into early practical use, mainly as a wireless power source in such devices as temperature, humidity and motion sensors.

OPV cells are solar cells that can be created by coating organic power-generating materials including carbon and sulfur atoms on a glass or plastic substrate with electrodes. As it can be shaped into thin, flexible forms, it affixes easily to walls or cloth surfaces where prevalent inorganic solar cells are unsuitable for installation. There are thus high expectations for OPV as a wireless power source for sensors and wearable devices, which are indispensable for Internet of Things (IoT) applications.

Toyobo has been developing a power-generating material for OPVs to yield high power outputs from low-illumination room light sources by using organic synthesis technologies it has cultivated in its years of research on fine chemicals. The material can dissolve easily even in halogen-free solvents, allowing it to be coated evenly on a substrate, and can thus generate power stably with little individual difference.

To commercialize the material quickly, Toyobo conducted the joint research with CEA for six months from June last year. During the undertaking, Toyobo and CEA succeeded in making the OPV small cells on a glass substrate with the world's best conversion efficiency by optimizing the solvents and coating technique. In a verification experiment under neon lighting with 220 lux, equivalent to the brightness of a dark room, the trial product was confirmed to have attained a

conversion efficiency of about 25 percent, or 60 percent higher than that of amorphous silicon solar cells commonly used for desktop calculators. They also completed prototype OPV modules on a PET film substrate with an effective area of 18 square centimeters, although coating a power-generating material on a PET film was more difficult than a glass substrate. The module was able to output about 130 microwatts under the same illumination.

Toyobo plans to market this material mainly to solar cell makers, based on the know-how acquired through the joint research. First, the company aims to deploy the material by March 2023 as a wireless power source for temperature, humidity and motion sensors.

Provided by CEA

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