



ArtESun demonstrates free-form organic solar modules for indoor and outdoor applications

The European FP7 project ArtESun has realized several versions of organic solar modules demonstrating the potential of this technology for different application areas. Developments ranging from novel active layer and electrode materials in combination with coating and module interconnect techniques has led to small and large area demonstrators with a variety in shape and size. Application use cases ranging from indoor RFID-tags to outdoor building-integration (BI) have been successfully demonstrated.

In an RFID tag (see Fig. 1), the battery pack is replaced by an organic solar module of the size comparable to that of a credit card to power the wireless communication between the tag and its reader and to power the integrated sensor device. In addition, auxiliary electronics including energy storage in form of a supercapacitor and overvoltage protection are integrated to the RFID tag to secure the operation up to one day during poor light conditions. The tag can sense the indoor surrounding temperature, which is monitored wirelessly with a hand held reader. Outdoors, a vehicle can be identified wirelessly with a fixed reader from a reading distance increased by a factor of 10 when utilizing the solar power compared to passive mode operation.

An aesthetically pleasing flower-like flexible organic solar antenna module (see Fig. 2) was realized by gravure printing to power a radio and an environmental sensor in a distributed wireless sensor network. The module has been optimized to operate under low or varying light intensities like for remote, autonomous precise environmental monitoring in agricultural applications.

Thirdly, larger area modules have been realized and assembled in a glass-based facade element for use in building integration. The BIPV element (see Fig. 3) was developed as a vertical fin as large as 1610mm x 380mm to be integrated as a ventilated façade within very well defined structural elements. Potential market acceptability, in terms of overall subjective properties (robustness, colour, design, reflection, etc.), was tested by means of a visual inspection experts' panel providing scores from 0 to 10. The result shows an overall excellent acceptance rating between 7-8 for this BIPV product.

Within the framework of the ArtESun project, VTT collaborates with imec (Belgium), Fraunhofer ISE (Germany), Imperial College (U.K.), IKERLAN S.Coop. (Spain), Corning SAS (France), ONYX Solar Energy S.L (Spain), Confidex OY (Finland), and Wibicom Inc. (Canada).

The ArtESun project is partly funded by the European Commission (FP7/2007-2013). More information on the project is on the website <http://artesan-project.eu/>



Figure 1: The RFID-OPV device is essentially a flexible label, ready to be attached on both opaque and transparent platforms. The credit card size OPV is powering the integrated sensor and boosting the communication between the reader and the tag.



Figure 2: aesthetically pleasing flower-like organic solar module, realized by gravure printing to power the sensor device in a distributed wireless network node



Figure3: OPV modules integrated in a building element for a ventilated façade in a fully operational microstation.