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Weathering-resistant and long-term stable solar film for building-integrated photovoltaics

The Fraunhofer Institutes FEP, ISC and IVV launched the BMBF (Federal Ministry of Education and Research)-funded project »flex25« to develop a solar encapsulation film for light-weight, flexible solar cells on 1 May 2013. Such solar cells would allow those parts of a building that have been unused up to now to be exploited for the generation of electrical energy – including industrial flat roofs, facades or large window areas.

Buildings have so far been used only by a small percentage to produce energy. But facades, window panes, sunshades or flat roofs offer huge open spaces in which photovoltaic modules could be integrated. It is expected that up to 50 percent of the energy demand could be satisfied with building-integrated photovoltaics (BIPV) in the long term. Thin-film photovoltaics open up whole new ways of integrating photovoltaic elements in the building envelope on account of their flexibility, low weight and the possibility of adjusting different levels of transparency and colors.

But flexible solar cells to date often lack weathering-resistance and a satisfactory service lifetime. The active layers within a thin-film solar module in particular are very sensitive to water-vapor and oxygen and have to be given the best possible protection against ambient conditions.

The Fraunhofer Institutes for Electron Beam and Plasma Technology FEP, for Silicate Research ISC and for Process Engineering and Packaging IVV, have already developed layer systems and production processes in multi-annual research projects which allow flexible electronic products such as organic light-emitting diodes (OLEDs) or displays to be very effectively protected against water-vapor and oxygen. The technology developed by the scientists currently achieves one of the lowest water-vapor permeability values for roll-to-roll produced systems in the world.

In order to make the proven layer system suitable for outdoor applications, such as its use in flexible solar modules, the scientists are aiming to improve the UV- and weathering-resistance of the encapsulating film within the frame of the »flex25« project (reference number: 03V0224, duration: 3 years) which is being supported within the scope of the BMBF-grant »Validation of the innovative potential of scientific research – VIP«. The technology will be transferred to a weathering- and UV- resistant substrate and the resistance of the layer materials themselves to environmental impacts such as

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UV-radiation will be improved. The group will hereby exploit its experience in the field of photovoltaics and front side encapsulation. The ultimate aim of this project is the roll-to-roll production of a lightweight, long-term stable front encapsulation of flexible thin-film solar cells with a service lifetime of 25 years.

Currently an encapsulation film that is suitable for outdoor applications is not available anywhere in the world. However, such a film would be a key enabling technology for building-integrated photovoltaics. If the front glass of a typical solar module could be replaced by a polymer film, for example, its weight might be reduced by up to 40 percent and roofs or building parts with limited bearing load of the construction such as industrial flat roofs could be used for photovoltaics.

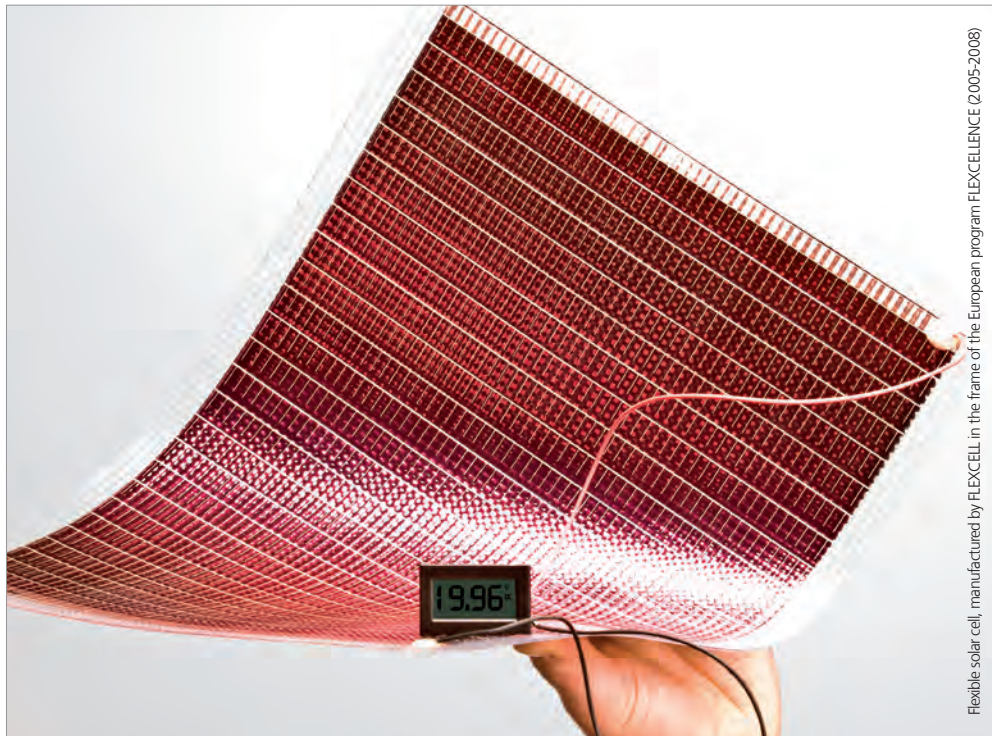
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More information can be found under:

 www.fep.fraunhofer.de



Encapsulation films for flexible solar cells will be adapted to environmental conditions such as UV-radiation in the »flex25« project.

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