Media release

Materials Science & Technology

Duebendorf, St. Gall, Thun, September 22, 2011

License issued for the functional principle of organic solar cells

From an Empa laboratory to a start-up in China

Flexible thin-film solar cells have good prospects to replace today's rigid silicon-based solar cells, among other reasons because their production requires significantly fewer raw materials. Empa recently filed a patent for a novel type of organic solar cell. A former Empa researcher will shortly start manufacturing and marketing the new cells with his Chinese start-up company.

The Empa patent concerns a novel thin-film solar cell in a "sandwich" construction. The real advance here is that the so-called active layer does not consist of rare and thus expensive elements but rather of synthetic organic dyes which have long been used in analogue photography for the emulsion of colour film. These absorb light extremely well, and they're also efficient at converting it into electricity. Thanks to an Empa development, more specifically: ultra-thin salt layers which form a kind of interface between the two active layers. In this way, the flow of charge – the electric current – generated by incident sunlight is dramatically increased between the two layers, and thus the efficiency of the organic solar cell, as laboratory experiments have impressively shown.

From the lab to industrial scale – a giant leap

However, what works flawlessly in the lab can't always be implemented in a practical setting, in other words, in industrial production. That's because the scale up from the lab to industrial production frequently proves complicated and expensive – common knowledge for investors and corporate decision-makers, whose support for this technology transfer is indispensable.

And a lesson to be learned by Bin Fan, a young Chinese researcher who was involved in the development of the new Empa solar cell as part of his PhD thesis. After he successfully earned his PhD, he wanted to pursue this development in his own company. When putting together his business plan, he found the necessary support at "glaTec", Empa's business incubator in Dübendorf, which promotes the founding of companies and innovative processes in the areas of materials and environmental science and technology. But even the best business plan isn't worth much unless you get funding. And exactly this money needed to get his start-up off the ground couldn't be found in Switzerland.

License issued even before the patent granted

The young Chinese had more success in his homeland where sustainable energy technologies have been promoted by the government since 2008 as part of the China Greentech Initiative. Bin Fan won a business competition and received a grant of 12 million yuan (roughly CHF 1.4 million) with which he founded the company, Weihua Solar, in his home town of Xiamen. Besides the founder's technical expertise, the young entrepreneur's most critical "asset" is a license for the further development of the solar cell which Bin Fan had already acquired – before the pending patent was even issued to Empa.

Meanwhile, he has ten employees, and on the side he sells various consumables which are necessary for solar-cell research. Frank Nüesch, head of Empa's Functional Polymers Laboratory and Bin Fan's thesis advisor, is pleased that the developments started at Empa are now making their way into practice. "For a researcher, this is a confirmation of his work." Nüesch estimates that another five to ten years of development effort are necessary before the first solar cells designed around this new principle can be put on the market. Even so, he greatly admires the step taken by his former student. "That requires, among other things, a certain willingness to take on economic risks. We could never have done that in our laboratory."

China Greentech Initiative

The China Greentech Initiative (www.china-greentech.com) was established in 2008 with government support to make China a technology leader in the area of environmental technology. At this time, more than 100 organizations are collected under the auspices of this initiative, and they are networked with more than 300 partners from industry – among them international corporations such as PricewaterhouseCoopers (PWC), Alstom, General Electric, IBM, Panasonic, BP, Bayer and the bank HSBC.

The initiative's activities are divided into six branches: clean conventional energy, renewable energy, electric infrastructure, efficient building design and construction, clean means of transportation and clean water. Upon submission of an application, the organisation awards support grants for environmental technologies, in this case organic solar cells.

Further information

Dr. Frank Nüesch, Functional Polymers, Phone +41 58 765 47 40, frank.nueesch@empa.ch

Editor / Media contact

Rémy Nideröst, Communications, Phone +41 58 765 45 98, redaktion@empa.ch

Thanks to the funds of the China Greentech Initiative Bin Fan, who was involved in the development of the new Empa solar cell as part of his PhD thesis, was in a position to found his own company in his home country.

Text and images in electronic form are available from: redaktion@empa.ch