

PHOTOVOLTAICS:

WILL FILM CLAIM ITS PIECE OF THE PIE?

BY DREW VASS

The word “photovoltaic” (PV) has appeared more often within the context of film and glass industries lately. But ask a company representative for any major window film manufacturer if PV film is on their to-do list, and you’ll likely get one of two things: the silent treatment or a simple no. But at least two major film manufacturers are linked to PV-related technologies to some degree by parent companies: CPFilms, through St. Louis-based Solutia Inc., and BSF through Bekaert in Belgium. When questioned about PV window film during an interview with WINDOW FILM magazine, Christophe Fremont, president of Bekaert Specialty

Films (BSF), replied with a silent but incriminating smile—nothing more.

This past June, Solutia unveiled its Saflex Photovoltaic business, designed to sell polyvinyl butyral interlayers to companies which produce the world’s largest thin-film PV modules. And as recently as August 1, Bekaert announced it had developed a new range of rotatable sputter target materials for the deposition of transparent conducting oxide layers used in PV cells. The Belgium-based company said its new materials are designed for “applications where optical transmission and electrical conductivity are required simultaneously.” But neither company is announcing that its photovoltaic technologies are being incorporated into window film products. Kathryn Giblin, BSF’s vice president of global marketing and technical services, suggests there is a possible role for window film, but not on the energy-production side.

“There is not much advancement in photovoltaics being incorporated into window film at the moment,” she reports. “Although window film could play a part in helping a building that employs photovoltaics to be even more efficient and it could increase the payback on both items.”

Representatives for CPFilms did not comment on the subject.

Old Hat

The concept of adding photovoltaic properties to transparent glass is nothing new. In fact, the concept was developed back in the 70s. By impregnating dyes in plastic, scientist were able to absorb solar energy and transfer it to the edges of a surface for collection; but the idea was abandoned when they discovered much of the energy was lost by the time it reached the edges of the glass. But that was then.

More than 30 years later, the concept has been revisited by none other than the Massachusetts Institute of Technology (MIT); and the institute is reporting favorable results for



Photovoltaic (PV) developers have long maintained that PV cells need to be encapsulated in glass, but Konarka Technologies Inc. recently announced its PV product has “shattered” the glass barrier and is capable of enduring the elements without the protection of glass.



those in the glass and glass coatings industries.

MIT's "solar concentrator" collects light over a large area (like a window) and gathers, or concentrates, the energy at its edges. As a result, the collection cells only need to be around the edges of a flat glass panel, according to Marc A. Baldo, leader of the effort and the Esther and Harold E. Edgerton Career Development associate professor of Electrical Engineering. In addition, the focused light increases the electrical power obtained from each solar cell by a factor of more than 40, he says.

The MIT solar concentrator involves a mixture of two or more dyes that is essentially painted onto a pane of glass or sheet of plastic. The dyes absorb light across a range of wavelengths, which is then re-emitted at a different wavelength and transported across the pane to solar cells placed at the edges. The development team believes this technology could be implemented within three years.

Where There's a Film, There's a Way

The glass industry has utilized film products and technologies for years to add features such as impact resistance, acoustic treatment and solar control to glass. PV is no different. Products such as Solutia's polyvinyl butyral interlayers are ending up in the glass found in curtainwalls and building envelopes where they produce and feed energy back into the circuit.

Nihon Telecommunications Systems in Japan recently introduced an energy-producing glass product to the public, according to a recent report by Engadget.com. At peak, the company reports that its product produces 70 watts of electricity per square meter, which can be accessed through USB ports, ending up in electronic devices like the iPod.

On a commercial level, however, building designers and owners are thinking much larger than USB devices. With the amount of glass found in the average high-rise building, companies can reduce power consumption by incorporating these technologies into a building's power grid. But, aside from new construction, the costs associated with replacing non-PV glass surfaces with PV counterparts could be enormous. It would seem natural that film companies would be racing to provide a retrofit solution; yet, to date, only one company has mentioned the words "photovoltaic" and "window film" in the same sentence.

This past January, Konarka Technologies Inc., developer of Power Plastic®, a polymer-based organic photovoltaic (OPV) technology, announced its plans to incorporate this material into a semi-transparent window film. And the company's focus wasn't only on the big commercial opportunities, but also on residential. In fact, Konarka announced it would focus on providing these technologies for various structures and homes of all income levels, including

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developing countries. In a move similar to MIT's developments, Konarka announced in March that it successfully conducted the first demonstration of manufacturing solar cells through an inkjet printing process. In the past, many PV developing companies have maintained the necessity of glass for this application, but Konarka recently "shattered" the glass barrier.

"Contrary to the majority of the research community, claiming that organic solar cells require packaging with either glass or very expensive 'super barriers,' we are proud to have demonstrated outstanding high lifetime for flexible cells packaged with commercially available, low cost materials," Rick Hess, Konarka's president and chief executive officer says.

The company failed to confirm whether or not its use of the words "window film" pertains to an interlayer, or a stand-alone product, but Hess' statements imply that at least some of Konarka's products will not require a glass envelope.

In addition to a "semi-transparent window film," the company's focus includes a number of applications where lightweight and transparency features provide an advantage—including one of window film's direct competitors. Prior to the release containing window film, Konarka announced it had teamed up with SKYShades, an Orlando, Fla., and Brisbane, Australia-based producer of fabric canopies and coverings to produce an energy-producing version of the company's products.

All Aboard

Konarka isn't alone on the PV bandwagon. DuPont Glass Laminating Solutions recently announced it is transferring a portion of its focus into the PV market. The company announced a price increase of up to 30 percent on all grades of its Butacite® polyvinyl butyral interlayer, effective August 1. Among other reasons, Stephen L. Cox, director of Glass Laminating Solutions and Vinyls for DuPont Packaging and Industrial Polymers says the global increase is necessary "to support continued investment in growing PVB [polyvinyl butyral] market applications such as photovoltaics." The company also has begun developing a plant in China to manufacture films for solar cells. Solutia also recently pulled back in one segment while investing in PV, when the

company placed its polyester business on the block, despite making significant investments in Saflex, a PV segment.

Why are so many companies robbing other sectors to feed PV efforts?

"We see this as a fast-lane business," Luc De Temmerman, president of Saflex told the *St. Louis Dispatch*. And according to Vince Van Son, commercial manager of Sustainable Solutions for Alcoa Building and Construction Systems, this move makes sense, because, he says, the global annual growth rate of PV is more than 40 percent.

The question is: are any window film manufacturers collaborating with companies like Konarka to ensure the window film industry receives its part of the PV pie? Konarka representatives refrained from comment at this time, but suggested checking back for an update later this or early next year. And this too was yet another question Fremont answered with the same incriminating (but silent) smile. **WF**

Drew Vass is the editor of WINDOW FILM magazine.

