In October, Valoe ramps-up a new IBC Zebra Cell manufacturing plant in Lithuania, the first one in Europe

New opportunities for integrated solar electricity

New PV technologies make it possible to create more diversity to the utilization of solar energy. High efficiency, low cost and good looks of PV applications make it feasible to integrate solar power to new products and environments.

Dr. Povilas Lukinskas tests IBC cell process at the Valoe Vilnius plant

Any self-powering object creates a local energy source. Solar energy can be used in many building integrated PV (BIPV) applications, such as facades, window structures or balconies. All vehicles are potential producers of solar energy. In principle, any energy-requiring object under the sun could produce PV power. Integrating PV can bring new value-adding features to products or even create completely new products. Producing local off-the-grid power will be the future. Now, is the time to redefine solar technology and make it a natural part of the environment.

Valoe´s integrated solar technology meets new challenges

There are no off-the-shelf products for integrated PV applications. The traditional cell and module designs cannot meet the various demands that the integrated PV will face. If PV is integrated into vehicles (VIPV), they need to survive vibration and to be shock and wear resistant. The weight of the module needs to be as light as possible and the PV element must be flexible and adjust to the surface form.

Survivability, in case of damage, is a very essential demand. If one part of the module gets broken, the rest of it must remain functional. Visual appearance becomes more and more important if the solar module is placed in urban space. Not to mention the building applications where architects make the visual look the most significant feature.

A traditional PV module is optimized for mass production and stationary installations. To meet the different requirements of integrated products, totally new PV technology is needed. Every application has its own demands where the cell and module design must be adapted. However, one feature is common: the highest possible efficiency of electricity generation is required.

Valoe is in the process of developing a technology platform for VIPV and BIPV applications. We will soon see self-charging cars, buildings generating their own electricity, evening lighting produced by daily sunlight. These and many other fantastic ideas may soon come true! However, they still require leaps of various length and close cooperation with multinational teams in PV product development:

- throughout the R&D process of a new integrated PV application, close cooperation with the customers is required
- deep understanding of various production processes is essential in choosing the most suitable technology, materials, and tools to produce the new integrated PV product
- demand for flexibility through the production chain to master wide variety of different technologies, materials, and processes

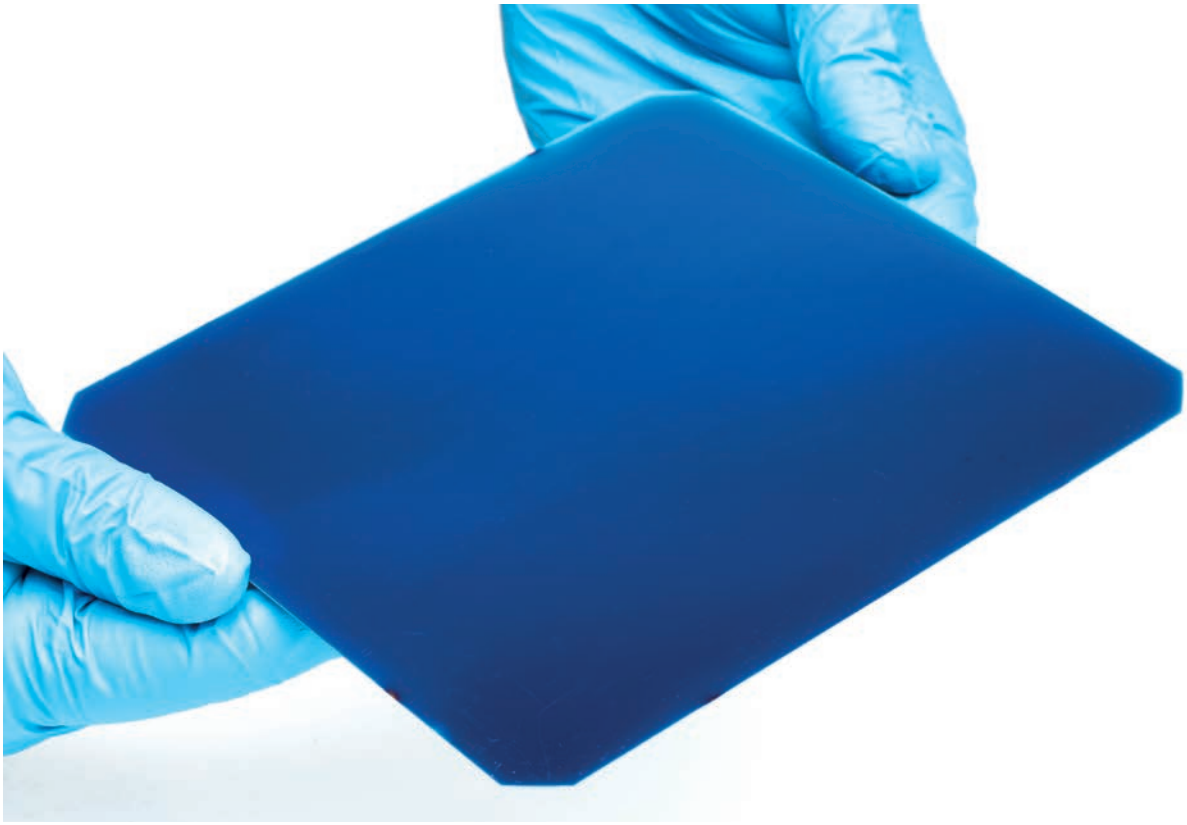
Valoe is a PV technology provider for new ideas

Valoe is a Finnish PV technology company with highly vertically integrated PV processes, not only for solar cell and PV module design and manufacturing, but also production processes, machinery design and ability to provide full scale production lines for the customers.

The company can operate as a technology provider between customer´s innovative need and the practical implementation of a product´s sustainable energy supply. The customer understands the product, its needs and market features. Valoe, in turn, knows options of PV technology.

Valoe has a long history as a high-tech company. Since the 1970s the company has had a reputation for innovative, automatic, robotic solutions and later as a major supplier of special components, like flexible electrical circuits, for mobile phone antennas of all major brands. In 2014, Valoe sold its industrial automation business to fully concentrate on the development of the next generation PV solar technology.

Valoe can now introduce a vertically integrated technology package comprised of



Valoe´s IBC cell is efficient and great looking. IBC cell along with back contact technology gives a lot of freedom to PV design

Project Manager, Ph.D. Jarno Kaakkunen with flexible Odd-Form PV module

IBC (Interdigitated Back Contact) cell, back contact module and manufacturing technologies, which are all based on Valoe´s own proprietary technologies.

IBC cell enables integration solutions

The integrated solutions, where the space is often very limited, need solar cells as efficient as possible. Valoe has developed high efficiency IBC cells with a well-known German Research Center, ISC Konstanz. The new IBC cell is very efficient in electricity generation, it looks great with a uniform dark blue, almost black, color and it is also cost efficient to produce.

For customized integration, IBC cell has special features: it can be cut into small parts, and with smaller pieces of cell the module can be made flexible and formable. The back-contact module technology makes it possible to design almost any application according to the customer´s specification.

Back contact technology – flexibility in production

Valoe has been developing back contact technology, both in modules, special components and in automation since 2013. This provides the tools to enable a completely new kind of product: flexible in product design, production and in the product itself.

The integrated PV products need the tailored production tools. With IBC and back contact

PV walls of a parking garage at the Helsinki-Vantaa Airport

technologies, Valoe can offer its customers the entire production chain from the invention to a finished industrial PV product.

Integrated PV module usually needs a customized production line and tailored materials. Valoe has designed and manufactured its own production lines and knows the requirements of different production technologies.

If Valoe is your R&D partner, it can test the production processes in its own factories. Then, it is also ready to offer the manufacturing technology of the customized product. Valoe can even run the production for a limited or infinite time to ensure a smooth availability of the customer´s PV products.

The integration is here already

The Sion: an electric car that charges itself through the power of the sun

Valoe has worked in cooperation with Sono Motors since 2018 to develop new integrated PV technology to a car that generates electricity for itself.

Sono Motors prefers 'solar instead of paint. The exterior of the Sion is entirely covered in Solar Body Panels. Solar modules are perfectly adapted to the shape of the vehicle. Solar cells are seamlessly integrated into the body panels. They are almost invisible, matching high aesthetic standards and without any compromise on efficiency or durability.'

After two years of hard work, PV panels that meet aesthetic and other requirements are now functional. The first test cars will be completed soon. The collaboration has been rewarding for both parties and gives good promises. A wide variety of new inventions and PV applications are coming into road transport once the R&D process is completed.

Car park: PV panels as facade material

If the solar panels are uniform in colour and meet other design requirements, they can be used as building integrated facade materials. The appearance of the facade is important, but the efficiency of electricity generation and long service life are also essential if profitability is to be calculated.

As soon as the look of the panels becomes more attractive building integrated solar panels will become more and more common. There are a lot of possibilities where the new PV technology for replacing expensive façade materials can be used. Thus, creating a pleasing appearance including the use of colour and the capability to simultaneously generate clean energy in an easy and a natural way.

A good example of solar walls is a car park where the solar power is used for charging electric cars. In 2020, Valoe installed solar walls to the new car park at Helsinki-Vantaa Airport, now under a major rebuilding and modernization process. It is difficult to see from the walls that they are made of solar panels. They are a natural part of the building.

New opportunity for the European PV industry

We are forced to switch more to renewable energy. Because large solar power plants are a problem in populated areas, integrated PV solutions create new ways to add solar electricity. The new technology also gives a chance for smaller, innovative technology companies to compete with the PV giants of the Far East.

The price is not the only crucial feature of the customized PV system. In Europe, we now have a quest to create our own, next generation PV technology, which is sustainable, environment friendly, flexible, and clever. A job to do for our PV institutes and companies!

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