

Which future for photovoltaics in Switzerland?

Further Information

More detailed information about the Photovoltaics and Thin Film Electronics Laboratory is available at:
pvlab.epfl.ch

“The problem of energy will become the key problem of the 21st century and Switzerland has a good chance to play a role in solving the technological problems involved. The country is in a very good starting position for PV technologies and in that sense it is really important that all actors in Switzerland, such as the government, the academic institutions, and the funding agencies, are aware of how important this topic is for the future of our society in general. They have to shift and allocate as many resources as possible to this topic. It is a strong message to develop novel and improve existing energy sources, develop cost effective ways to store or save energy and improve the management of energy. All the measures that point towards more sustainability will be necessary for a better world in fifty years.”

Christophe Ballif is director of the Photovoltaics and Thin Film Electronics Laboratory at the Institute of Microengineering (IMT, EPFL) in Neuchâtel. In the following interview, he presents an overview of ongoing research on photovoltaics in Switzerland and its perspectives.

Mr. Ballif, how has Switzerland positioned itself in the photovoltaic (PV) domain?

Currently, Switzerland is already competitive in the PV domain in terms of the production of equipment and in the development of new solutions for measurement systems or components such as inverters or electrical connectors. This is well in line with the industrial tradition of the country relative to the commercialization and export of production tools such as the machine-tools of the past. Of course we need to ensure that we will remain competitive in the long term, coming up with further technological innovation and, since PV develops worldwide, trying to take an even larger share of the market.

The actions required are, first and foremost, a much stronger support for high-level research and development. Secondly, we need to provide the relevant industries with the possibility to collaborate with the research institutes and to access their results. Finally, the development of a domestic market for PV modules in Switzerland would create a strong stimulation motivating these industries to develop better equipment and solutions.

In terms of producing PV modules, we have several module producers in Switzerland, which have to find their own niche market where they can compete with Asian or German products. Indeed, you need to stand out with your products, such as light weight, flexible PV membrane or special architectural solutions, or show your competitive edge with, for example, a new generation of high efficiency modules. I am confident that we can be competitive with Chinese companies if we choose the right technology.

What position has Swiss research in the photovoltaic domain worldwide?

In terms of research, Switzerland has quite an opportunity. Even though it is a rather small country, it has various excellent research institutes, including the EPFL in Lausanne and Neuchâtel and Empa in Dübendorf. Their research covers the major categories of devices that are now on the market, particularly thin film devices.

The group of Ayodhya N. Tiwari is active in flexible so-called CIGS solar cells and cadmium telluride PV. The group of Frank Nüesch is active in organic PV, while Michael Grätzel pioneered dye-based PV cells. Our group in Neuchâtel focuses on silicon based devices, with high efficiency crystalline cells and low cost thin film silicon modules. All these groups are well positioned internationally. A lot of know-how is available and, in addition to that, several universities of applied sciences and several industrial research laboratories, including companies such as Oerlikon Solar, have specialties well placed on the market.

To which extent does Swiss research cooperate with industry?

Several companies are making a big effort in PV R&D. Besides Oerlikon, you'll find companies such as Von Roll or Meyer Burger (see p.30). But you'll also find Roth & Rau, a German company that has opened a R&D subsidiary in Neuchâtel, or DuPont that has established a PV application research laboratory in Meyrin/Geneva. Most of these companies have direct links to or contracts with academic laboratories.

How do you contribute to the cleantech field?

Our laboratory offers contributions in various fields. Firstly, we create know-how for applicable technologies and transfer this know-how either to the relevant industries or other actors.

Secondly, we play a very important role in educating people in the PV industries. Some have already studied or worked at IMT. Right now we also propose a special education program relating to our technologies that are now implemented in many production lines worldwide. We regularly host people from companies such as Bosch, Oerlikon and others that come here for a one-week visit to better understand the scientific basis of the devices they are producing. And of course we want to create economic value: we want to create start-ups and jobs; we want to help companies to create new business segments with our core competencies.

In Switzerland, we have fantastic tooling industries and equipment makers. They do not automatically have the know-how but the capacity to build innovative tools for the cleantech field. We have many projects with companies such as Solneva, which develops tools for laser based applications, and Essemsolar, which develops new screen printing systems. We are linked to about 15 companies in Switzerland alone, helping them to put better technology solutions on the market.

We heard about a stronger collaboration with CSEM. What can you tell us about that?

Rather than to speak about collaboration, I would say we are developing part of our activities along with CSEM. Our laboratory, even though it has grown considerably over the last years reaching now about 60 employees, has remained an academic service. Considering the bright future for solar energy it is important to develop technologies at a more commercial level, more oriented towards the industry.

We need centers where you have people that stay long enough to develop very strong activities and master stable processes. This is not always the case in an academic environment where you have people coming and going. We aim to set up facilities that are closer to the industry and, in that context, CSEM is an excellent platform with a mission that has been underestimated in Switzerland.

What distinguishes CSEM from other institutions?

Creating a strong link between research and its applications has not been so much in the focus of Swiss policymakers. But CSEM has managed to act as a crucial interface between research and industry. In Switzerland, CSEM is really a key player for the fast transfer of technological innovations to industry. This successful concept can now be applied for the development of the PV field. There are similar centers in other countries in the world, like the Fraunhofer Institutes in Germany or technology centers in Singapore or Taiwan, which are already oriented toward creating economic value. I think Switzerland needs a CSEM or an equivalent service that is five or ten times larger!

(fad,cs)



Christophe Ballif

Christophe Ballif is director of the Photovoltaics and Thin Film Electronics Laboratory at the Institute of Microengineering in Neuchâtel, which has been part of the Swiss Federal Institute of Technology in Lausanne since 2009. The laboratory is active in the fields of thin film silicon, high efficiency heterojunction crystalline cells, and module technology. The laboratory has a strong expertise in technology transfer and industrialization of novel devices.