Cover Power
Smart Glass Coatings for Innovative BiPV Solutions

Project duration: from 10.2018 to 09.2021
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Publishable Summary

From many research & development activities on PV module applications it has been found in recent years that the optical appearance of PV modules is mainly determined by the outer side (environmental side) of the cover glass of the modules. In particular, reflections of the incident light on the cover glass surface are essentially responsible for the overall optical perception of the modules. It is precisely this fact that makes it difficult to effectively tune the aesthetics of a photovoltaic module, for example by changing the colour of the solar cells used. In contrast, it is more promising to modify the surface that is mainly responsible for the optical perception to match the design: the outer surface of the cover glass.

The project Cover Power addressed exactly this challenge. By combining different kinds of glass coating technologies, the project results allow for new degrees of freedom for the design of PV modules for BiPV solutions.

In detail, the coatings, applied were characterized optically and their chemical and physical stability was investigated. The durability of these coatings was further evaluated by performing environmental simulations and accelerated aging tests were performed on test modules to assess their performance stability.

The results show an efficient coluring of BiPV modules and also address a problem that in the past has proven to be an obstacle for some facade-integrated BiPV projects: glare. As outcome of the project prototypes of BiPV modules were developed, that are based on the typical glass-glass PV module technology in combination with Si solar cells by applying novel glass coatings to the outer side of their cover glasses. These module prototypes feature the following properties:

- Flexible and innovative design in terms of colour and surface texture
- Minimum glare (less than 0.1% of specular reflection)
- At least 150 W/m² (STC) by exploiting back reflected light in bi-facial cells
- Aging and adhesion of surface coatings are reliable for at least 30 years

A further outcome was the realization of a BiPV installation in a façade (see picture below) and a roof to demonstrate the feasibility of the developed module prototypes. This installation will be operated by echoch2 beyond the end of the project.

Photo of the test façade with grey screen-printed modules.

In addition, ertex-solar as well as Joanneum Research are planning further activities as follow-up to the project Cover Power: The screen printing technology in particular has proven itself in use under real life conditions. Here, ertex-solar plans to continue the concept of screen printing with a special ink that incorporates colouring particles for a more vivid colour impression and higher module efficiency. In addition, this ink allows for a homogeneous overall appearance for a facade or roof installation.

Joanneum Research is planning further cooperative research activities in the field of sol-gel coating. The focus will be primarily set on increasing the stability of the coating with respect to weathering and to develop an industrially applicable and automated coating process together with an industrial partner.

Project consortium

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Participating countries and financing:

Country	**Number of organisations involved**	**Project costs in EUR**	**Public funding in EUR**
Austria	5	325'468	186'870
Switzerland	1	112'827	46'330
Total	*6*	*438'295*	*233'200*

Funding agencies involved and contracts

Funding Agency	**Contract N° and Title**
FFG	Project Number: 863509 eCall Number: 11019633 Title: Cover Power: Smart Glass Coatings for Innovative BiPV Solutions
SFOE	Contract no. SI/1501627-01 Order no. 810005388 Title: Cover Power: Smart Glass Coatings for Innovative BiPV Solutions

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