

# Aesthetic solar cells

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## ABSTRACT

To prevent global warming it is necessary to reduce the use of fossil fuels dramatically. Buildings use more than 40% of the world's primary energy consumption and contribute to 24% of the emission of green house gasses worldwide. By implementing solar panels in building we could reduce these numbers. Today only 4% of Danish buildings use solar cells. One of the reasons for this is that people does not perceive solar cells as an aesthetic contribution to buildings which we found out from talking with architects, solar cell companies, costumers and potential costumers of solar cells. It is difficult to integrate solar cells aesthetically in many types of buildings, and we have chosen to develop a concept for integrating solar cells in bigger facades. Three main challenges have been identified with today's solar panels:

1. They all look the same with only blue and black colours, which only gives little design freedom for the architects
2. The surface of the panels is characterised by a certain pattern and have an eye-catching frame, which often is perceived as unattractive features. A homogenous surface and no visible frame would contribute to more aesthetic attractive solar panels.
3. Solar panels are often difficult to fit into a facade because they are produced in only few different sizes.

The developed concept is a solar panel, which seeks to provide a solution to these challenges. The conceptual solar panel has a homogenous surface and will be in a range of different colours. This is made possible by using back contacted solar cells and having a back sheet that match the colour of the solar cell. The colour of each solar cell can be modified by manipulating the nanostructure. This is explored in collaboration with, DTU Nanotech, and it is examined how it will affect the efficiency of the solar cells. The solar panels will be modular, which means that each module consists of a single solar cell, which is assembled into bigger panels in the desired constellation. This will make it possible to adjust the panel sizes so they fit on many kinds of facades.



**Figure 1:** Facade with aesthetic solar modules and a single solar module (15x15cm)