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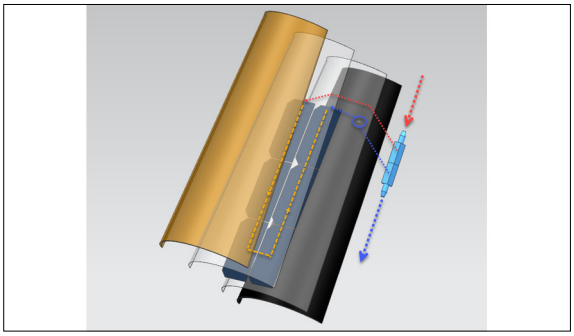
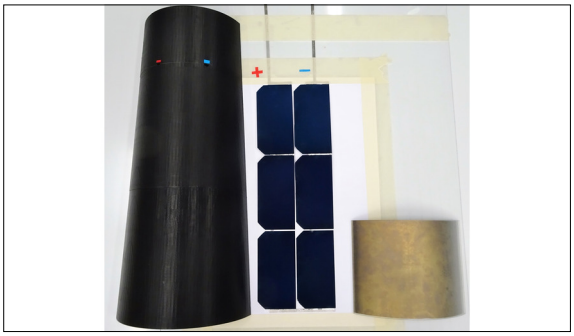
Examiner	Prof. Christof Biba
Subject Area	Electric solar technology
Project Partner	iEnergies, Herr Pola, 6516 Gerra Piano, TI

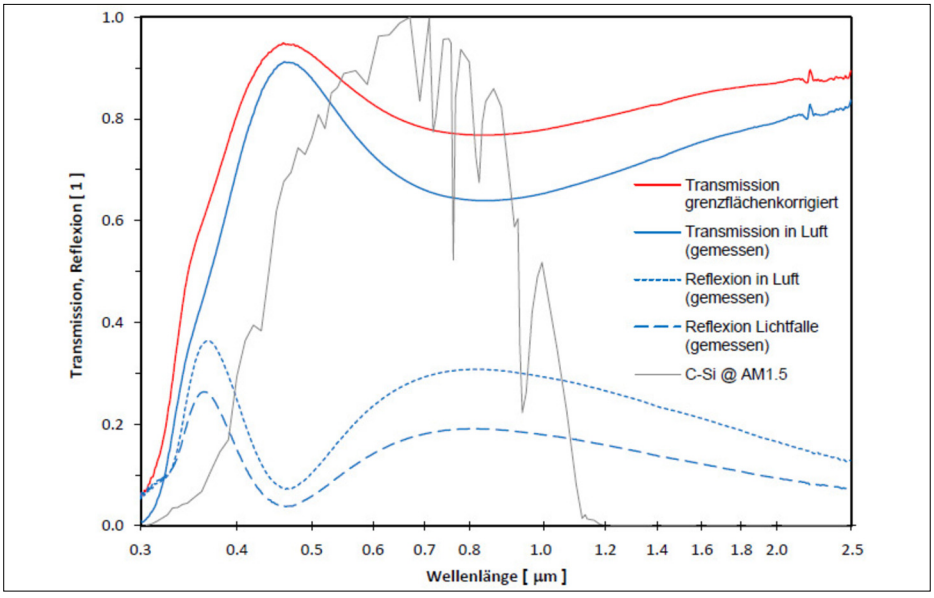
Product developement of a photovoltaic rooftile



Structure of the solar tile: frontsheet (terracotta), encapsulant foil, solarcells, backsheet (black), junction box



State of prototyp: 3-D backsheet template (l.), stringed c-Si-Cells (m.), colour couted glass sample for frontsheet (r.)



Glass transmission test: colour has no significant influence on transmittance. Dominant losses between 0.6 and 1.2 um.

Introduction: Building integrated photovoltaics (BIPV) is a growing industry. This multifunctional product aims to generate power and replace conventional elements of the building skin. Solar tiles belong to this kind of products. There is a variety of products available for flat roof tiles, but there is a scarcity for curved roof tiles. This kind of conventional roof tiles is widely used in the southern French region. For this reason the swiss startup iEnergies wants to develop a product for this particular market. The aim of this students semester project is to develop a basic concept for a prototype based on the product idea of iEnergies.

Procedure / Result: As requested by the company the focus lies on the casing and the cell technology. The existing concept has been reviewed and different approaches have been used to develop new concepts for the solar tile. The advantages and disadvantages of the elaborated concepts were evaluated. Further, the mechanical strength of the casing of the solar tile was numerically simulated with ANSYS. In order to get an impression of the economical potential of the solar tile, a brief product analysis and an estimation of the costs has been made. Additionally, it was attempted to build a prototype.

Result: A final concept for the iEnergies Solar Tile was created. The solar cell type fulfils the flexibility and efficiency requirement. A wiring and layout concept was created which is optimized for power production. Further the by iEnergies chosen glass type was re-evaluated. The transmittance factor is 0.816. This was considered acceptable. On the mechanical side, the material does not seem to meet the minimal requirement to withstand a hailstone impact. Finally, the expected product was considered too expensive.