

Solar-activated glass façade – heat and power generation

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Generic project information

Motivation

Development of solar activated building components:

- Improvement of architectural quality of solar collectors
- Reduction of installation cost

Method and Approach

- Module and façade conception (material and connections)
- Assembly of thermal and photovoltaic-thermal panels
- Investigations on performance and durability of the panels
- Construction and long-term monitoring of a large test façade

Aims

- Development of an uncovered thermal collector based on an enamelled glass pane
- Development of a photovoltaic-thermal panels based on the glass-glass photovoltaic technology
- Flexible integration of the panels in ventilated glass façades

Partners and Support



Supported by:

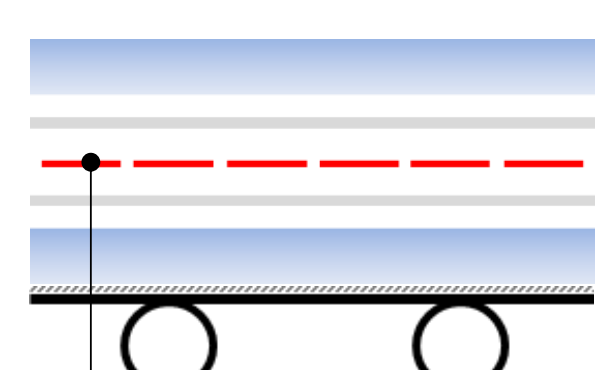
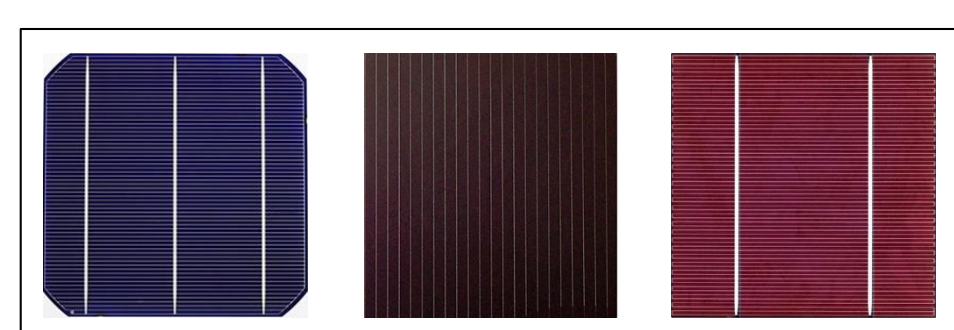


on the basis of a decision by the German Bundestag

Niedersachsen
FKZ: 16KN014827

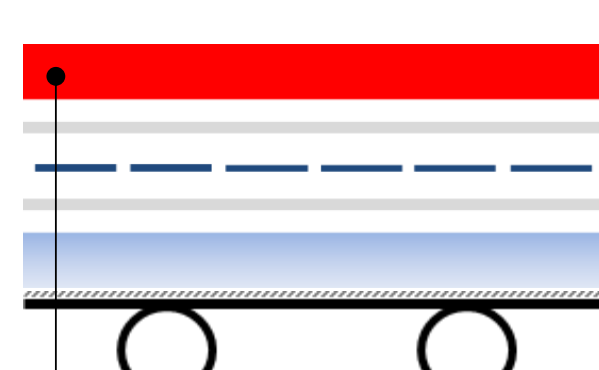
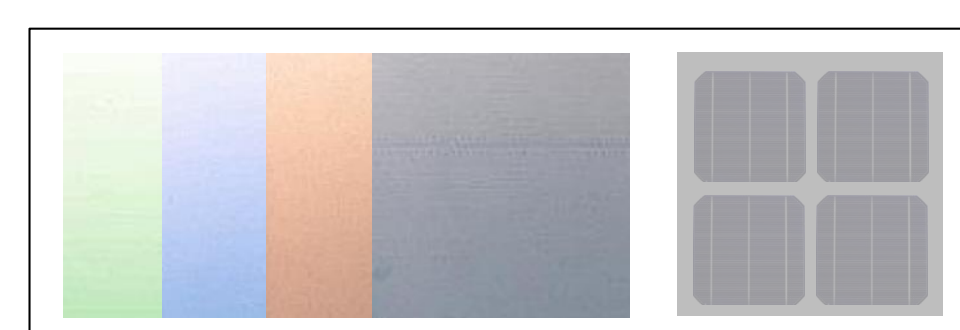
Module design solar-activated glass façade panel

Photovoltaic-thermal glass panel (design options)



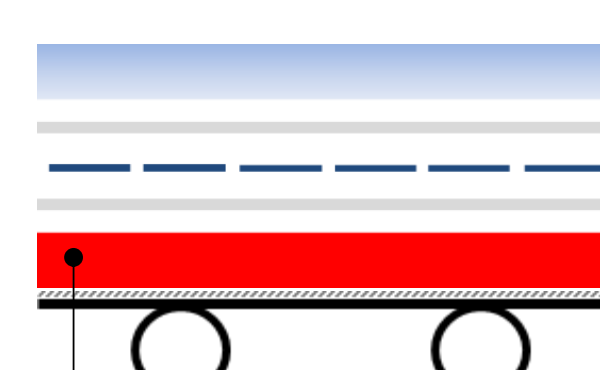
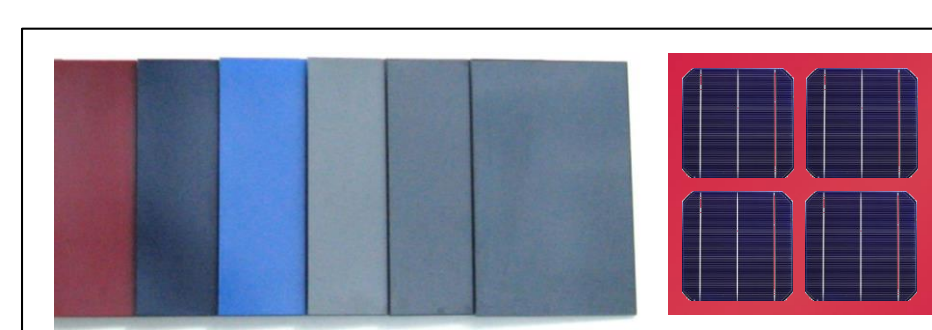
Solar cells

- Cell technology
- Colored AR-coating



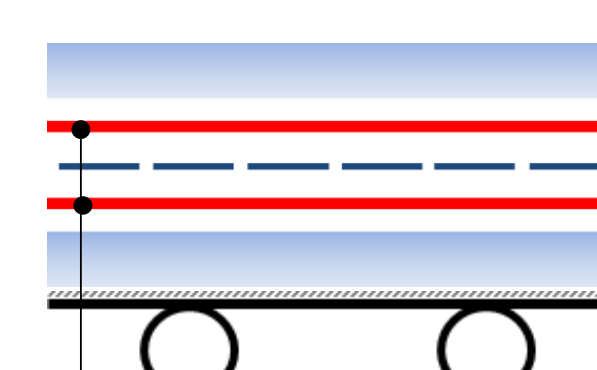
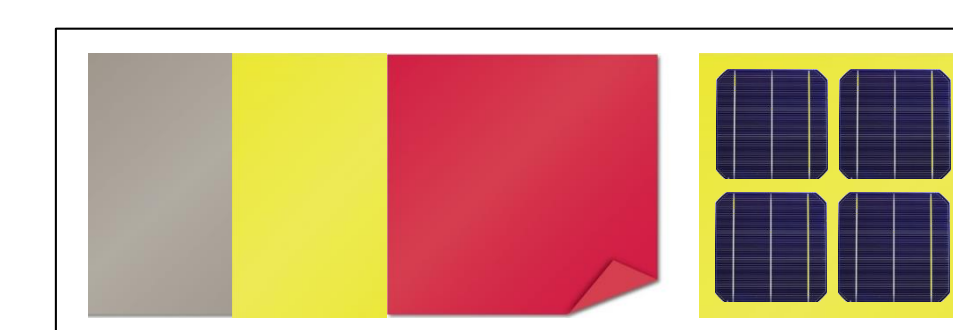
external pane

- Glass substrate
- Colored/selective coating



rear pane

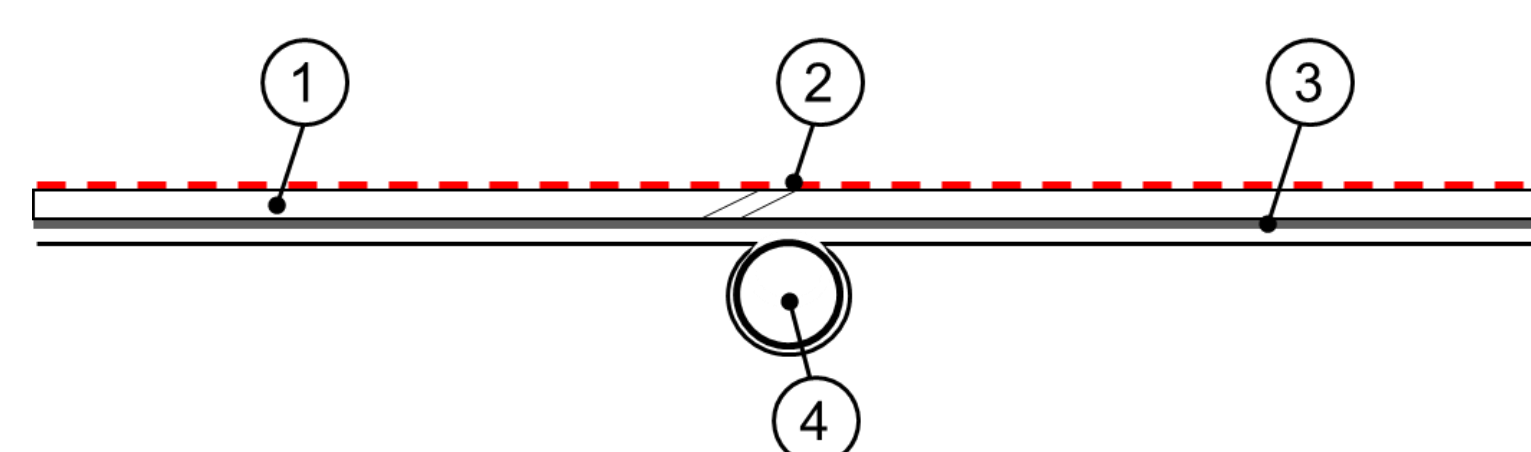
- Glass substrate
- Colored coating



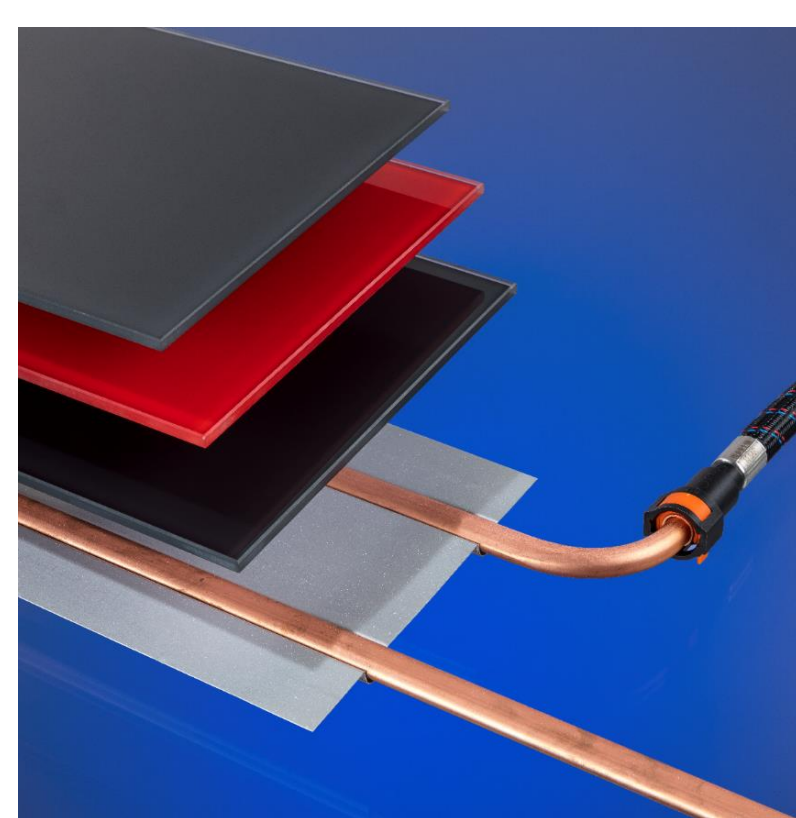
laminating films

- Colored substrate
- Front and rear

Thermal glass panel*



- Enamelled glass pane (1)
- Low-e-coating (optional) (2)
- Adhesive bond (3)
- Heat exchanger (4)



*ISFH-Patent EP 2 607 814 B1

Optical properties of the enamelled pane and PVT-module

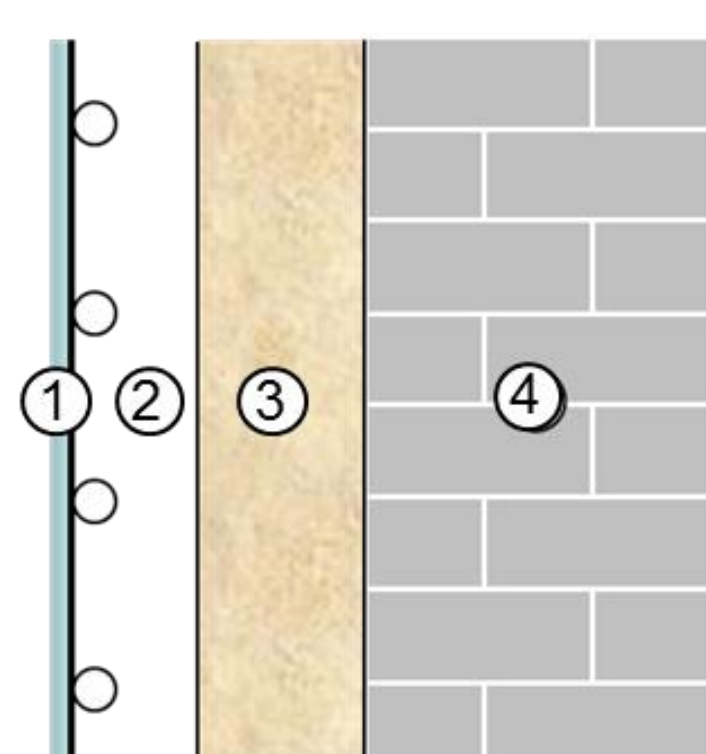
- Solar absorption: 0.94 (black), 0.73 to 0.93 (colored)
- Thermal emittance: 0.16 (low-e coating) to 0.84

Performance of the modules

- Conversion factor η_0 : up to 0.78
- Heat loss coefficient $b_{1.5 \text{ m/s}}$: 10.2 – 17.8 W/m²K

Rear-ventilated curtain glass façade

Façade design



- Solar-activated glass panel (1)
- Ventilated cavity (2)
- Thermal insulation (3)
- Massive Wall (4)

Test facility



- First façade realized with solar-activated glass panel (see red marking, approx. 15 m²)
- Appearance identical to not activated modules
- Easy integration of both thermal and photovoltaic-thermal panels
- Performance and reliability confirmed in module tests and façade operation

Performance results

