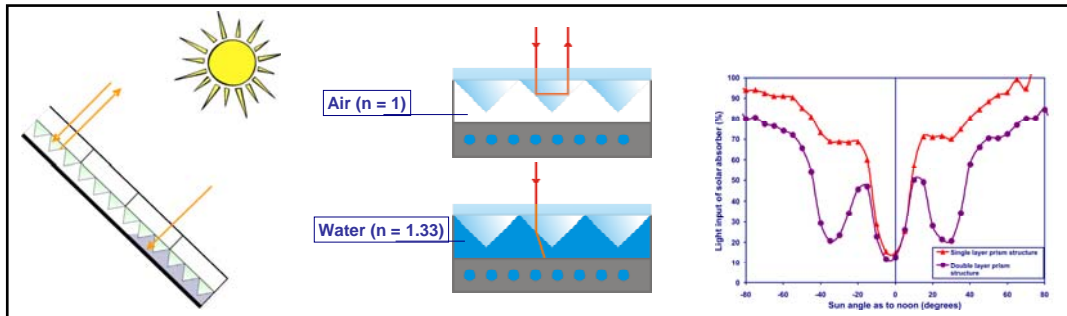


Market Sector:  
Solar collectors, Sustainable energy, Building materials

## Solar collector overheat protection

A cheap but efficient self limited temperature control system



### Summary of invention

A solar collector with a prismatic optical layer that is transparent under normal operation but totally reflective above the boiling point of the heat transporting fluid. By choosing an appropriate fluid the stagnation temperature of the solar collector is thus automatically limited and cheap standard plastics/polymers can be used for the construction of the solar collector.

### Applications

The main application of the switching prismatic layer is in cheap mass produced solar collectors for warm water. It can be produced by standard extrusion together with the rest of the solar collector. The invention is preventing degradation due to overheating of transparent materials like polycarbonate. A typical use of the invention is to protect solar collectors from overheating, which can occur when a solar collector is not used for a long period or when (due to a malfunction) the solar collector is emptied. Although the protection ability of the invention is designed for implementation in solar collectors, it is not limited to that.

### Commercial partner

Proof of principle is demonstrated and a solar collector prototype has been tested. The invention does not need any intensive research or development before implementation in applications. The invention might be of special interest to parties in the building material sector or in sustainable energy applications.

### KEYWORDS

Solar collector;  
Overheat protection; optical switch;  
temperature limitation; self stagnating temperature

### KEY BENEFITS

High solar collector performance

Standard (cheap) plastic can be used since overheating is impossible

Standard extrusion can be used for large scale production

### PATENT / IP STATUS

Patent application filed, R. Griessen and M. Slaman

### PATENT NUMBER

P6017675NL  
OCN-2001271

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## Background

Highly efficient solar collectors have the problem that high stagnation temperatures are reached when little hot water is used. Two strategies are usually used to cope with this problem: high temperature resistant materials or dumping excess hot water. The first option requires expensive materials while the second is environmentally unfriendly. Our invention limits automatically the solar heat input whenever the temperature of the heat transport medium exceeds its boiling point. This is simply achieved by using a transparent prismatic layer in front of the solar heat absorber. Under normal operation it is immersed in the heat transport fluid. As the index of refraction of the prismatic structure and the fluid are similar solar light is little deflected and reaches the absorber. Above the boiling point of the fluid the prismatic layer is not immersed in it anymore and it reflects the incoming solar light through total reflection. The fluid can easily be adapted to local situations. The great advantage of our invention is that cheap and easily extruded plastic solar collectors can be produced. This opens a promising path to mass production.

## Remarks

Higher oil and gas prices are fuelling demand for solar heating systems even more strongly than for photovoltaics. The years of cheap oil are definitely over. Moreover, Western Europe's heavy energy dependence incites governments to supporting solar thermal applications. Market developments are highly promising. The heat generation costs of solar thermal plants are competitive compared with oil and gas heating systems. However, commercially available solar collectors are more expensive to buy than conventional heating systems. Our auto-safe plastic solar collectors can reduce the price of solar heating considerably.

Unlike photovoltaics, solar heating directly replaces valuable gas, oil or electricity that is used for heating or cooling purposes. This would allow Europe to replace around 30% of its oil imports from the Middle East.

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