

## **Polymeric materials for solar thermal collectors - a feasibility study**

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The scarcity of fossil fuels is beyond question - one way to save these resources is to make use of solar thermal energy for domestic hot water. So far, solar thermal collectors mainly consist of glass and metal parts. Not simply substituting materials in existing systems but developing a fundamentally new design is the objective of the research at the Fraunhofer ISE in the framework of Task 39, a task within the Solar Heating and Cooling Programme of the IEA.

Key advantages of polymers are cost as well as weight reduction, along with the benefits and cost savings associated with well established manufacturing processes and improved fastening, reduced part count, and overall assembly refinements.

Since the economic viability of solar collectors is strongly linked to the costs of the system, a decrease in the costs of the system would lead to a higher market penetration. However, also the probably changed system performance is an important element and may not be forgotten.

To consider these elements in an integrated way, the Fraunhofer ISE is currently working on the concept of a full polymeric collector, as only then the full potential of polymeric materials can be used. The talk describes results of this work.

One topic is the identification of the requirements for the polymeric materials. Important parameters are of course on one hand the absorption of solar radiation, the thermal conductivity and the heat capacity. But on the other hand one has to consider the intrinsic stress factors like UV-radiation, high temperatures and mechanical load because the systems have to reach a service life time of more than 20 years.

With the help of numeric simulations of the fluid dynamics in the collector, possible geometries are tested and optimized. The aim is to develop a layout which assures a homogeneous flow and a maximized contact area between the absorber and the heat transfer fluid.

Besides the technical view, it is also important to have a look at the economics of a new designed system to ensure acceptance and success of the technology. Here not only the material costs are relevant, but also the manufacturing technologies and their specific costs as well as the costs for shipping, handling and installation have to be considered.

*For the full text/presentation contact the author(s) or the publisher:*

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