2009 HIGHLIGHTS

SHC Task 39
Polymeric Materials for Solar Thermal Applications

THE ISSUE

One of the greatest challenges of the 21st century is to secure a sustainable, competitive and safe energy supply and to considerably reduce CO_2 emissions and the potential serious consequences of climate change. The aggressive energy targets being set by countries will only achievable with considerable growth of the solar thermal markets. And, this will require large quantities of reliable, efficient and cost-competitive solar system components. Today, solar thermal collectors mainly consist of glass and metals. And, this will need to change as market prices for metals fluctuate significantly.

As new materials are considered in the manufacturing of solar system components, polymers are rising to the top. Polymers offer mass production options, increased freedom in component design, and reduction in component costs and weight.

OUR WORK

The objective of Task 39 is to assess the applicability and the cost reduction potential by using polymeric materials and polymer-based, novel designs of suitable solar thermal systems and to promote increased confidence in the use of these products by developing and applying appropriate methods for assessment of durability and reliability. These goals will be achieved by either less expensive materials or less expensive manufacturing processes.

SHC Task 39 is a four-year collaborative project that will be completed in September 2010.

PARTICIPATING COUNTRIES

Austria
France
Germany
Norway
Portugal
Sweden
Switzerland
United States

14 Industries

Task Date	**2006-2010**
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KEY RESULTS OF 2009

Polymers for glazed solar collectors

The variety of materials, designs and production techniques illustrate the large potential of polymers in solar thermal

During 2009 three different polymeric collector designs were realized and demonstrated in Task 39. The designs vary significantly in materials used, applied production techniques and functional design. The collector concepts were designed for solar-assisted domestic hot water preparation and/or heating of buildings.

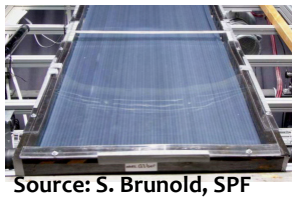
The first concept is based on the expertise of Söhner Kunststofftechnik GmbH on thermoforming and includes glazed ABS absorbers and PC-based collector casing.

Source: Söhner KT GmbH

The second concept is all-polymeric collector absorbers of PPS, a high-temperature performance polymer, which is the outcome of collaboration between the Task 39 partners Chevron Phillips Chemicals and Aventa. Here the sheet extrusion of PPS was realized for the first time worldwide on an industrial scale. By the end of 2009, the first demonstration projects were installed in Norway.

Source: Aventa

The third concept is a prototype of a polymeric collector of PA-pipes with thermotropic coating as overheating protection, a collaborative work between the *Institut für Solartechnik* - SPF and EMS-Chemie.



Source: S. Brunold, SPF

Heat storage

Polymeric liners for seasonal and small- and medium- sized solar thermal stores

Within a German research project supported by BMU the Task 39 partners at Kassel University developed a novel buffer store of PP-H, which should overcome the market barrier of present storage technologies for medium-sized solar thermal (ST) systems (>20 m^2). Due to low production costs, flexible and easy installation of the present storage design medium-sized ST systems should become more competitive. Since 2009, this concept is being marketed by the company FSAVE Solartechnik GmbH.

Source: FSAVE.de

The Task 39 partners at ITW Stuttgart performed material, processing and aging studies on polymeric liners for seasonal thermal heat stores (TES). The results were published in a PhD thesis by F. Ochs in 2009*. A HDPE membrane with vapor barrier was realized in the solar assisted district heating system in Eggenstein-Leopoldshafen (Germany) with 1,600 m^2 flat plate collectors and 4,500 m^3 seasonal storage.

Source: Ochs, ITW

Multifunctional coatings and overheat protection

Thermotropic layers open for commoditive plastics in glazed collectors

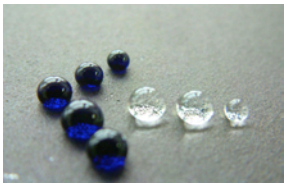
The large potential of thermotropic layers as overheat protection in glazed collectors

was demonstrated in a project at the Polymer Competence Center Leoben (PCCL) in collaboration with AEE INTEC and the University of Leoben. Thermotropic layers were prepared according to a requirement profile from model calculations and the effectiveness to limit the collector's stagnation temperature was shown. Currently, these coatings are being further developed, optimized and produced in larger scale by the partners.

Source: PCCL

Multifunctional coatings on polymeric collectors

Funded by a MATERA project, the partners at the National Institute of Chemistry in Ljubliana, Color and Aventa are developing self-cleaning UV protective clear coatings for polymer substrates and further colored, thickness insensitive coatings that aim to enhance the visual variety and performance of polymeric absorbers.


Source: I. Jerman, NIC

Taskforces in Task 39

Standardization/testing/certification

The existing European Standard EN 12975:2006 does not reflect the requirements for testing polymeric collectors in all test procedures. The Taskforce "Testing/ Standardization/ Certification" in Task 39 is coordinating a proposal for the revision of the existing EN 12975 standard to be appropriate for the testing of polymeric collectors.

Demonstration of visually appealing systems

Task 39 is in the process of creating a database of "visually appealing" building integrated solar thermal systems. The collection of examples started in 2009 and in 2010 a small team of architects and technical experts will lead the selection process to finalize which systems to include in the database.