

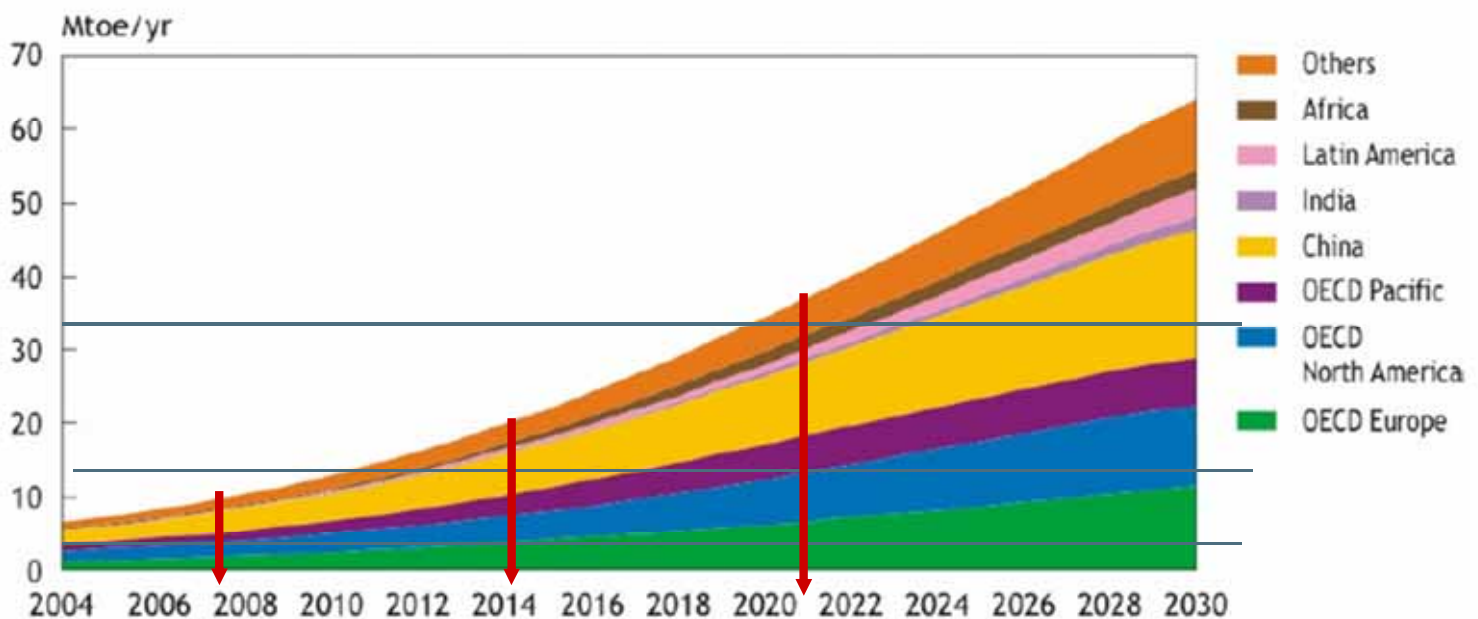
Polymere Materialien für solarthermische Anwendungen

Task 39 des 'Solar Heating and Cooling Programme' der International Energy Agency (IEA)

Michael Köhl
Fraunhofer Institut für Solare Energiesysteme
Freiburg, Deutschland

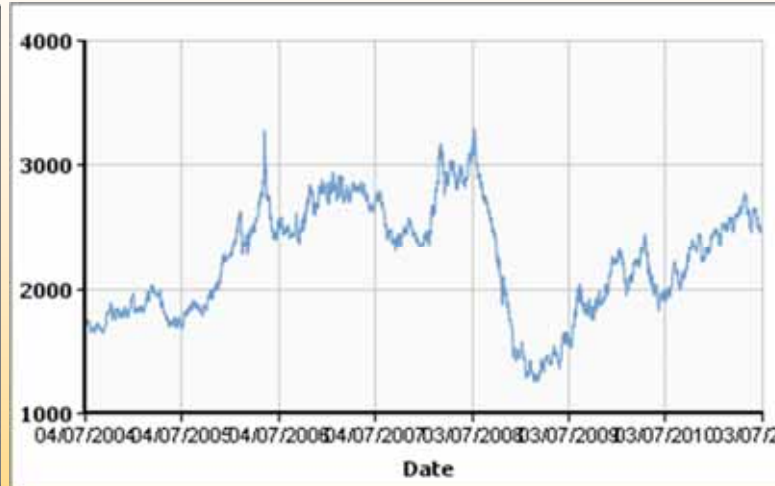
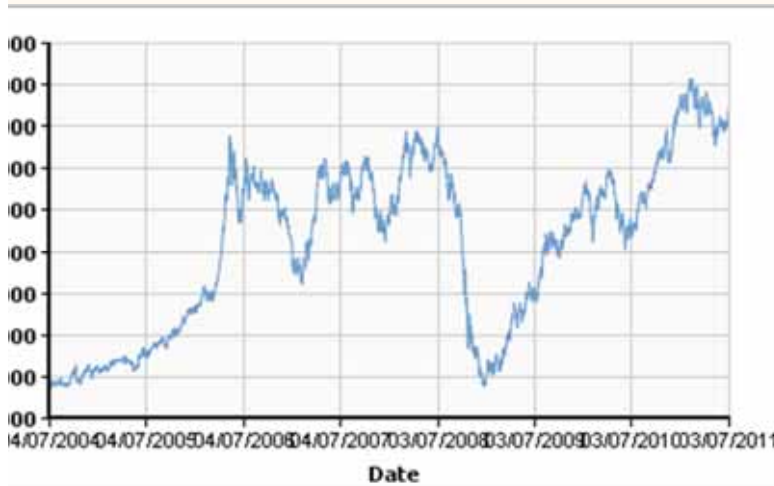
Solarthermischer Energieertrag (Hochrechnung des IEA RETD)

Figure 26. Deployment of solar thermal collectors in terms of energy outputs projected out to 2030 by region.



Source: IEA, 2006f. 1Mtoe = 42 PJ

Verdoppelung alle sieben Jahre (konservative Schätzung)



Mitte 2004 – 2011 Kupfer

Aluminium

Quelle: LME 2011



Polymeric Materials for Solarthermal Applications

Ziele der Task39

Herausarbeiten des Kostenreduktionspotentials durch die Verwendung von polymeren Materialien und geeigneten Systemen:

- Preiswerteres Material
- Preiswertere Produktionsprozesse



Polymeric Materials for Solarthermal Applications

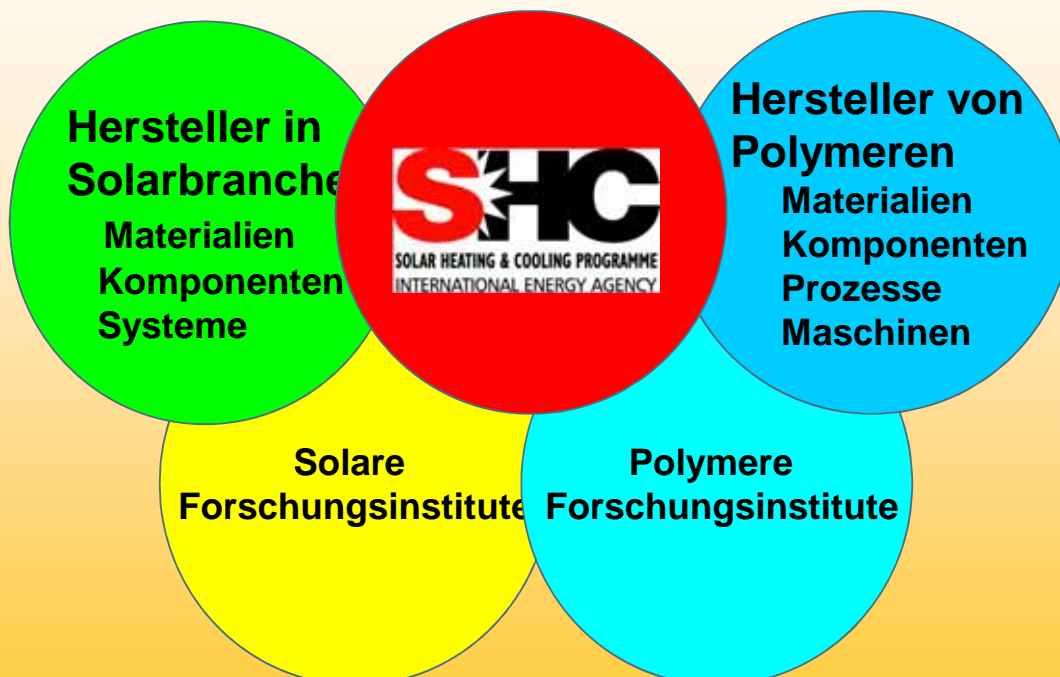
Vorteile:

- Kostenreduktion durch Massenproduktion
- Ungebundenheit im Design
- Leichtgewicht

Nachteile:

- Beständigkeit
- Wärmeleitfähigkeit
- Hohe Investitionskosten

Partner in der Task 39



Subtask A: Information

Norwegen, Michaela Meir

Subtask B: Kollektoren

Frankreich, Philippe Papillon

Subtask C: Materialien

Österreich, Gernot Wallner

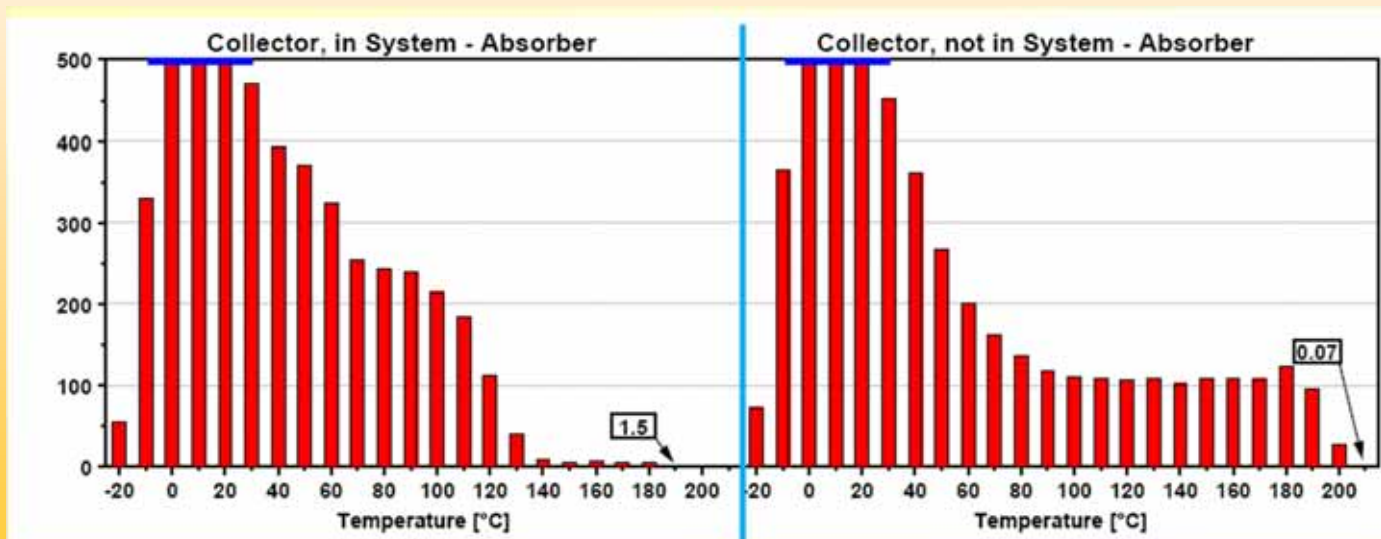
TASK39

Polymeric Materials for Solarthermal Applications

Subtask B *Kollektoren*

Jahres-Stress-Profile des Absorbers

- ▶ **Beträchtliche Temperaturbelastung in Betrieb (→140 °C)**
- ▶ **Extreme Temperaturbelastung in Stagnation (→208 °C)**



TASK39

Polymeric Materials for Solarthermal Applications

Subtask B Kollektoren

Polymere Kollektoren
auf dem Markt

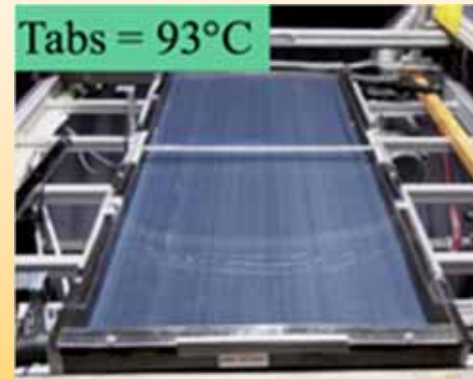
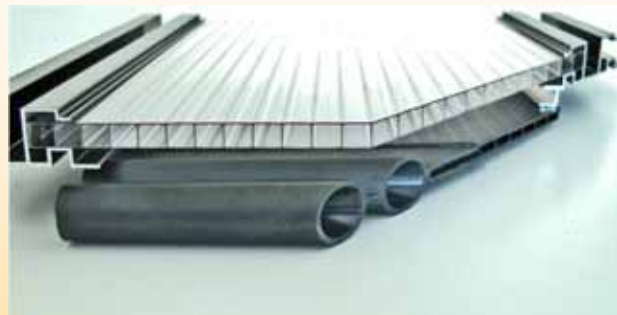
Unverglaste PP-
Absorber (Fafco, USA)



Kollektoren mit integriertem Speicher in Kalifornien und Portugal

Subtask B Kollektors

Absorber-Prototypen

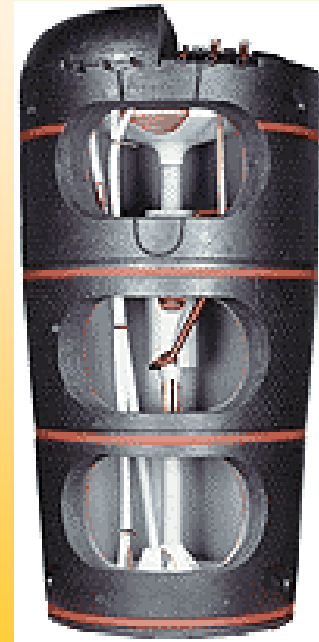


Extrusion
Spritzgießverfahren
Thermoplastische Umformung

Prototypen müssen charakterisiert und optimiert werden

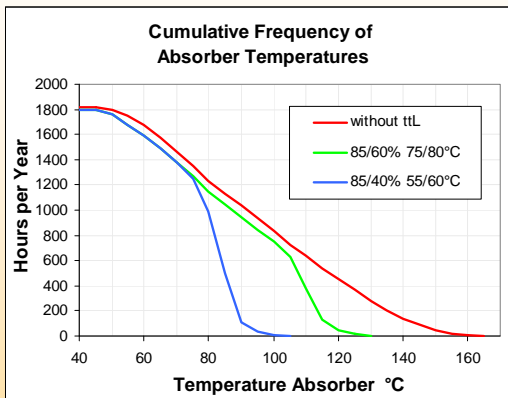
Barrierefolien für saisonale Speicher

Kurzzeitlagerung
Wärmetauscher



Subtask C *Polymere*

Funktionelle polymere Materialien und
polymere Oberflächen



Verbesserung der Beständigkeit durch Überhitzungsschutz

=> Gebrauch von weniger teurem, Massenkunststoffen

Thermotropische Materialien

Thermotrop

Änderung der Eigenschaften beim Erreichen der Schwellentemperatur

Gliederung von lokalen Unterschieden im Brechungsindex

Übergang von transparent zu wolzig



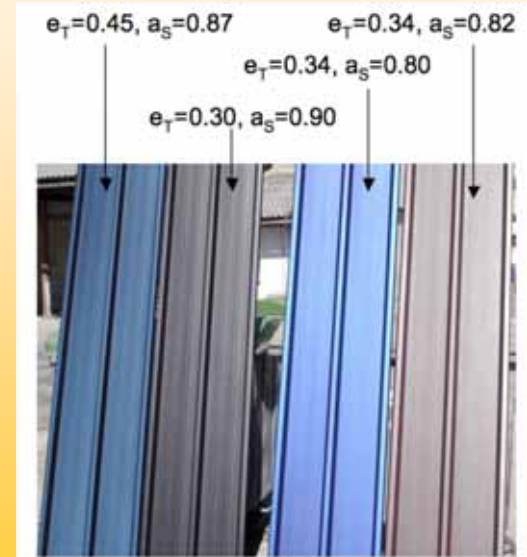
25.09.2007, KR

Source: Hartwig, 2011

Subtask C Polymere

Funktionale polymere Materialien und polymere Oberflächen

- selbstreinigende klare Beschichtung mit UV-Schutz für polymere Substrate



- schmutzabweisende TISS-Farben (schichtdickenunabhängig und spektral selektiv)

Subtask A Information

■ Taskforce:

- "Wie kann man solarthermische Systeme ansprechender gestalten?"
Hervorragende Beispiele zur Gebäudeintegration von Solarthermie

www.iea-shc.org/task39/projects/



■ **Das Buch:**
 ■ *Alles, was wir wissen.....*

Erscheint 2012

Chapter/Section
Introduction
1 Thermal solar energy for polymer experts
1.1 Principles, solar energy
1.2 Solar Thermal Market
1.3 Solar thermal systems and technical requirements
1.4 Conventional collectors, heat stores and coatings
1.5 Economical aspects
1.6 Standards, performance tests of solar thermal systems
2 "Polymers" for solar thermal experts (50-70 pp)
2.1 Market
2.2 Polymeric materials
2.3 Processing
2.3.1 Structural polymeric materials
2.3.2 Functional polymeric materials and coatings (processing)
2.4 Durability for solar thermal application
2.5 Properties (Campus database) and materials selection
2.6 (Typical design processes): Flowchart and references
3 Polymeric materials in solar thermal applications
3.1 State of the art: Polymeric materials in solar thermal applications
3.x Favorable systems with polymeric materials
3.2 Specific materials for solar thermal application
3.2.1 Multifunctional structural materials
3.2.2 Functional materials and coatings
3.3 Conceptual design of collectors
3.4 Novel collectors and heat stores
3.5 Durability tests of polymeric components
3.6 Architecturally appealing solar thermal systems – a marketing tool
3.7 Obstacles for the application of current standards
3.x Conceptual thinking around overheating protection (Include somewhere:)

Neue Aufgaben für 2010-2014

- ⇒ Empfehlungen für
 - ⇒ Thermosyphon
 - ⇒ Flachkollektor
- ⇒ Machbarkeitsstudien
- ⇒ Konstruktionen
- ⇒ Kostenabschätzung
- ⇒ Gebrauchsdauer

Task 39: Polymeric Materials for Solar Thermal Applications

Contents:

- Solar thermal collectors and systems
- Task 39 Testing Standardization Certification - 3
- Performance and cost characteristics of polymeric collectors - 5
- Rezeptions- und Reflektionskoeffizienten von Solarthermiekollektoren - 6
- New types of thermal collectors - 6
- CO₂P: Collector paint waste factors - 7
- Polymeric solar collectors: Field testing of solar collectors systems - 9
- From polymer Angled collectors - 9
- Polymers materials
- Comparing task difficulties Classification table - 2
- Reporting quality requirements of knowledge - 3
- Implementation of thermal collectors table - 4
- Overheating protection principles of the task: PA - 4
- SHC and IAEA: Application of the solar thermal collectors - 5

NEWS

April 27-28, 2009

The 6th IEA-SHC Task 39 Experts Meeting was hosted by the Institute for Solar Technology (IST) and took place at the University of Applied Science WZL in Paderborn, Germany from April 27-28, 2009. 30 experts were present at the meeting. 10 participants were invited by partners. Most of the presentations and the results from group work at the Experts Meeting are summarized in this newsletter. The Experts Meeting included excursions to the IAEA's Institute for Solar Technology and IST's Processing and to the solar collector facilities at IST. The evening lunch reception to celebrate the meeting on April 28 was sponsored by IST.

Task 39 - Participant table

The experts in Task 39 are from 11 countries: Germany, Italy, Spain, Switzerland, Czech Republic, France, Austria, and the USA. The experts are: Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST), Prof. Dr. G. Hofmeier (IST).

Systeme f

⇒ Task 39 Newsletter
<http://www.iea-shc.org/task39/newsletters/>
 Einschreibung: Michaela Meir <m.g.meir@fys.uio.no>

- Participants

#	Institution	Country
1	AEE-INTEC	Austria
2	Austrian Institute of Technology	Austria
3	PCCL - Polymer Competence Center	Austria
4	University of Leoben	Austria
5	University Linz	Austria
6	University Innsbruck	Austria
7	Chevron Phillips Chemicals	Belgium
8	Enerconcept	Canada
9	CEA INES	France
10	BASF AG	Germany
11	Bosch Thermotechnik	Germany
12	FH Ingolstadt	Germany
13	Fraunhofer ISE	Germany
14	Humboldt University Berlin	Germany
15	ITW, University of Stuttgart	Germany
16	Roth Werke GmbH	Germany
17	Söhner Kunststofftechnik GmbH	Germany
18	University Kassel	Germany
19	MAGEN ecoenergy	Israel
20	Aventa AS	Norway
21	University of Oslo	Norway
22	DER/INETI	Portugal
23	Prirev	Portugal
24	NIC - National Institute of Chemistry	Slovenia
25	Linnæus University	Sweden
26	EMS-Chemie AG	Switzerland
27	NREL	USA
28	FAFCO	USA
29	University of Minnesota	USA

Task 39: Viele engagierte Experten

Arbeiten an der solaren Zukunft



Vielen Dank für Ihre Aufmerksamkeit !!