ECN

Energy research Centre of the Netherlands

Advanced materials for thermal energy storage

Proposal for a new IEA task

Background

- Renewable heating requires thermal energy storage; thermal energy storage requires good storage materials

- IEA SHC Task 32 and IEA ECES Annex 10, 17, 18, 19 have shown that we really do not know enough about materials to reach new solutions for compact thermal energy storage

- Strongly growing interest in thermal energy storage

Objectives

- To arrive at significantly improved thermal energy storage systems
- Identify, develop, and test advanced materials for storage
- Design and develop new materials or composites
- Develop measuring and testing procedures to characterise these new materials reliably and reproducibly
- Conduct pre-standardisation work for advanced thermal energy storages
- Disseminate knowledge

Scope

In terms of materials:

- Phase change materials
- Thermochemical materials, including sorption
- Composite materials, nanostructures
- Micro- and macro-encapsulation, suspensions, emulsions, …

In terms of applications:

- Renewable energy, with the focus on solar energy
- Energy conservation

Main challenge:

- Bring together experts from material science and from solar/renewable applications

Main activities

- Material engineering
  - analysis and engineering of advanced materials
  - synthesis of new materials and composites
  - materials characterisation and testing
- Numerical modelling
  - molecular interactions
  - mass and heat transport phenomena
  - bulk behaviour
- Components and systems
  - Criteria for materials development derived from applications
  - development, modelling, testing thermal storage components and systems

Collaboration

- Thermal energy storage is relevant to *many* IAs
  - Energy Conservation through Energy Storage
  - Solar Heating and Cooling
  - SolarPACES (Concentrating Solar Power)
  - District Heating and Cooling
  - Heat Pumping Technologies
  - Energy Conservation in Community and Building Systems
  - Industrial Energy-related Technologies and Systems
  - Renewable Energy Technology Deployment

- Proposal:
  - Implement task under SHC
  - Strong collaboration with ECES (proposed Annex 23)
  - Collaboration with other IAs

Timeline

October 2007	First task definition meeting, Zürich
Nov/Dec 2007	Presentation at ECES and SHC ExCos
Jan-Jun 2008	Draft task definition document including Workshop, task definition meeting
Jul 2008-2013	Five-year task

Interested organisations

AT	AEE Intec	Martin Schatzmayr
AT	University of Graz	Wolfgang Streicher
CH	Base Consultants	Jean-Christophe Hadorn
CH	EMPA	Viktor Dorer
CH	HEIG-VD	Jacques Bony
CH	SPF	Paul Gantenbein
DE	Fraunhofer ISE	Peter Schossig
DE	ISFH	Dietmar Gross
DE	ITW Stuttgart	Harald Drück
DE	University of Kassel	Klaus Vajen
DE	Vaillant	Max Bankowski
DE	ZAE Erlangen	Franziska Scheffler
DK	DTU	Jørgen Schultz
ES	Acciona	Javier Gravalos
ES	University of Lleida	Lluisa Cabeza
FR	CSTB	Peter Riederer
FR	EDF	Philippe Stevens
FR	GRETH	Bernard Thonon
FR	INES	Philippe Papillon
FR	University of Perpignan	Vincent Goetz
FR	University of the Savoie	Lingai Luo
IL	Ben-Gurion University	Gennady Ziskind
NL	ECN	Marco Bakker, Wim van Helden
NL	TNO	Lucienne Krosse
NL	University of Eindhoven	Camilo Rindt
SE	Chalmers University	Jan-Olof Dalenback
SE	Dalarna University	Chris Bales
SI	KI	Venceslav Kaukic
SI	Silkem	Andrej Horvat
UK	Ciba Specialty Chemicals	Kishor Mistry
UK	University of Warwick	Philip Eames

Discussion

- Scope: Materials versus Applications
- Maximise involvement of both ECES and SHC
- Inclusion of other application areas/implementing agreements
- How to include materials experts from ‘strange’ fields