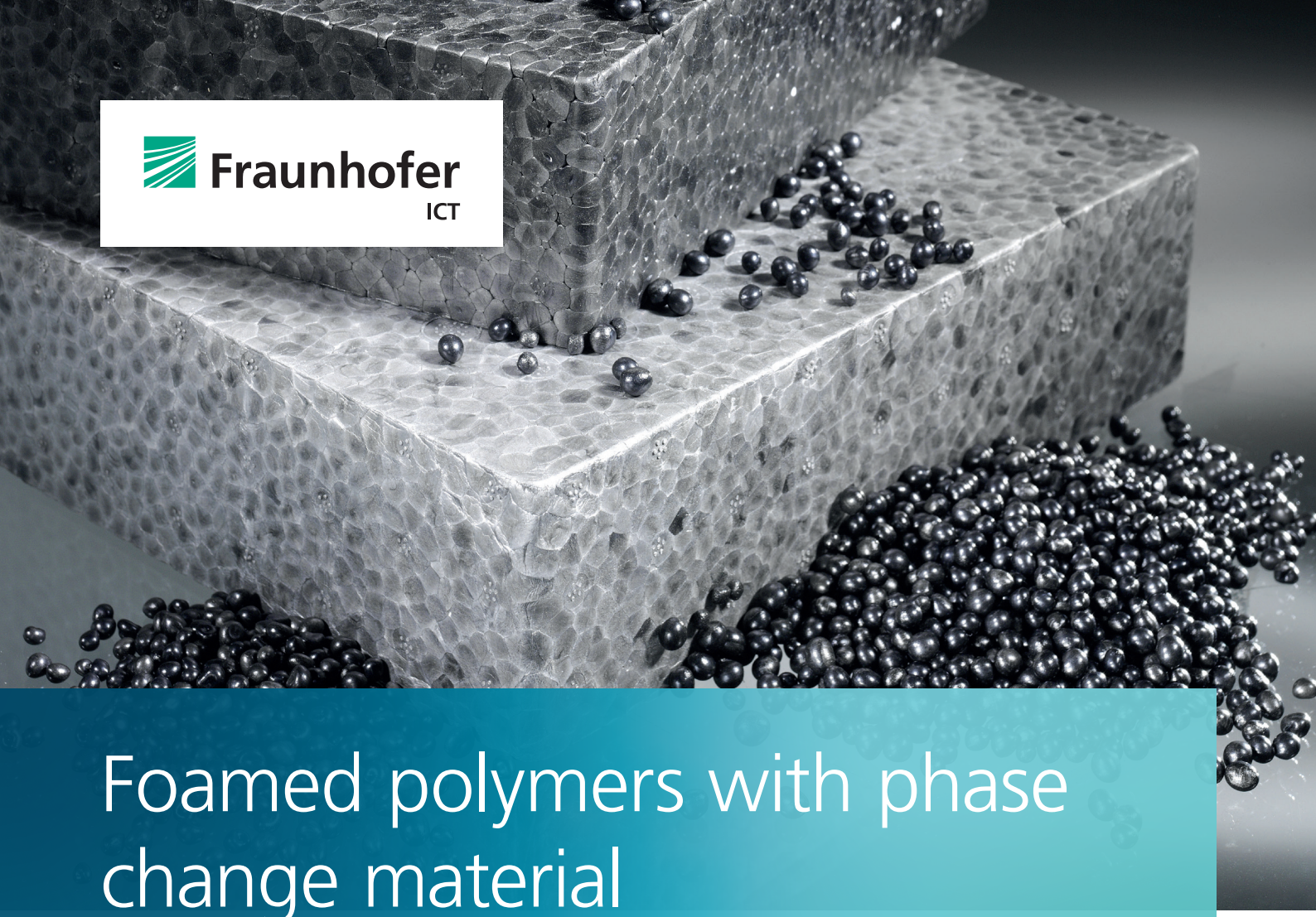


Fraunhofer ICT

Foamed polymers with phase change material

By combining foamed polymers with phase change materials (PCMs), the insulation properties of the foams are combined with the thermal properties of PCMs. PCMs have a high storage capacity in defined temperature ranges. They balance temperature fluctuations by absorbing and releasing heat depending on the ambient temperature. They consequently ensure an optimal, comfortable climate for people and technology.

To achieve this in specific applications, the major development step required is the integration of PCMs into components and systems. Through an established particle foam process – so-called steam chest molding – the thermal properties of the PCM are combined with the insulating properties of foamed polymers. The heat flow in components consisting of these material combinations is significantly lower than in conventional foam structures.

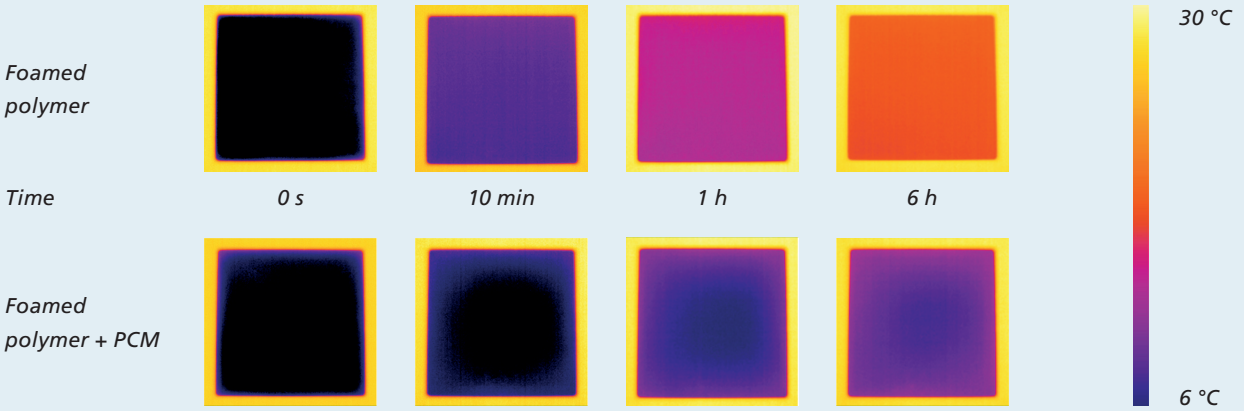
Our service offer

We offer our project partners and customers comprehensive system analysis for the combination of PCMs and particle foams, tailored to specific application conditions. This includes material characterization and solution concepts for the incorporation of PCMs into particle foam components.

Above:
foamed polymer/structures with PCM

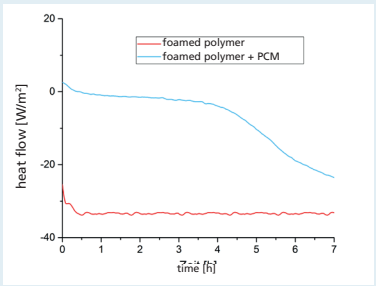
Below:
transport box, which maintains the transported goods at a temperature of plus 5°C through the use of cold accumulators with phase change materials

Temperature behavior of a sheet made of foamed polymers and foamed polymers with PCM

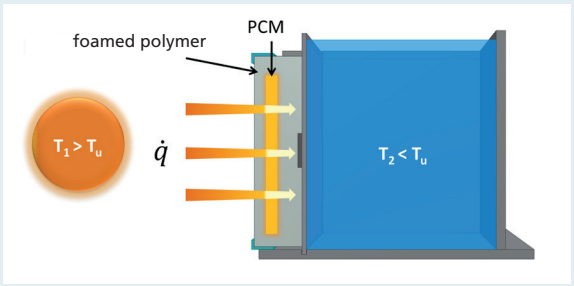


Component development of foamed polymers with phase change materials (PCMs)

Material



System design



System development

Materials

- Selection
- Characterization
- Kinetic evaluation
- Modification/functionalization of PCM and particle foam

System design

- Thermodynamic analysis
- Power dynamics
- Safety
  - Fire protection
  - Mechanical stress

System development

- Compatibility with various polymeric matrix materials
- Manufacturing of components to demonstrator parts
- Economic evaluation

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