TUHH
Thermische Verfahrenstechnik

Scale-up of Aerogel Manufacturing Plant for Industrial Production

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Introduction and Aim of Work

TUHH along the iclimabuilt partners will target an accelerated industrial take-up of aerogel materials by lowering the application entry threshold and reducing the aerogel market development risks for European companies:

- Scale-up of existing manufacturing plant to 1500 Lt./year
- Development of new insulation materials for Nearly-Zero-Energy Buildings (nZEB):
  - Load-bearing carbon concrete layers (HPC (high performance concrete)
  - Core Materials: Infiltrated Cellular Lightweight Concrete (CLC) with integrated aerogel
  - ➢ Lightweight panels with improved insulation properties

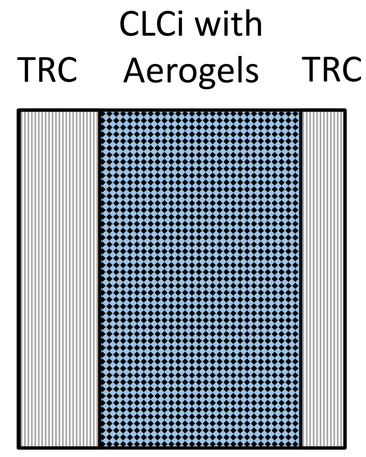

Figure 1: Test Case Material, Prototype of Sandwich Panel including Textile-Reinforced Concrete (TRC), CLC and aerogels

Aerogels for New Insulation Materials

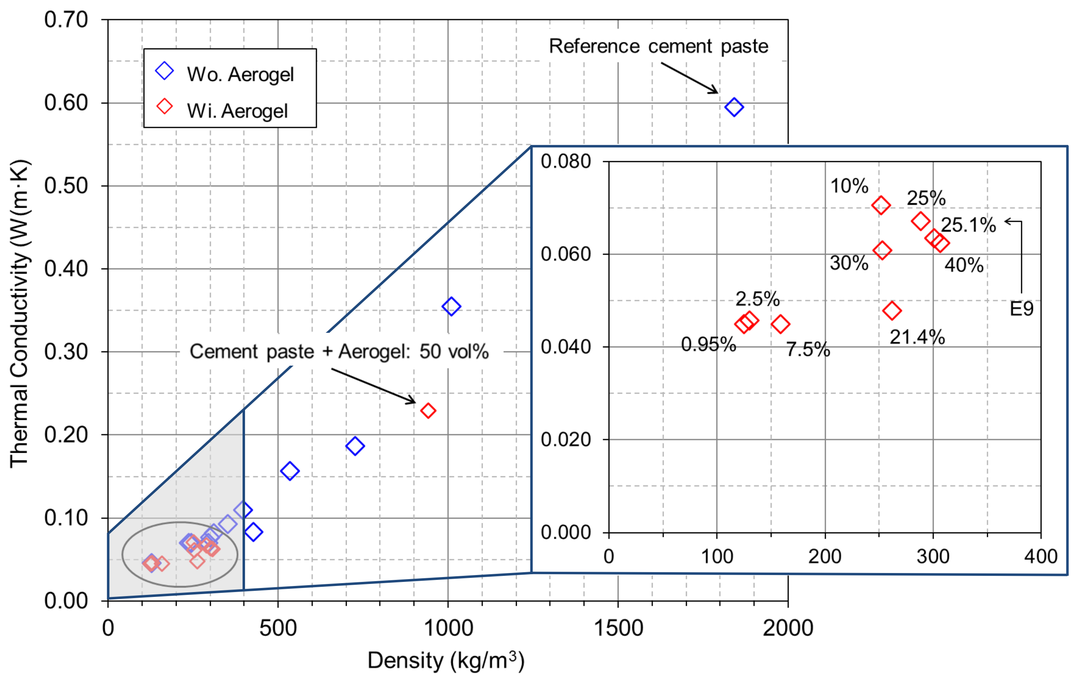

Figure 2: Influence of aerogels on thermal conductivity and density of commercial cement paste

- Test material with lower density and thermal conductivity as compared to commercial materials → min. 43 mW/(m·K)
- Sandwich panels: Varying aerogel content in CLC, Thermal conductivity of min. 35 mW/(m·K)
- ➢ New materials with promising perspective in nZEBs

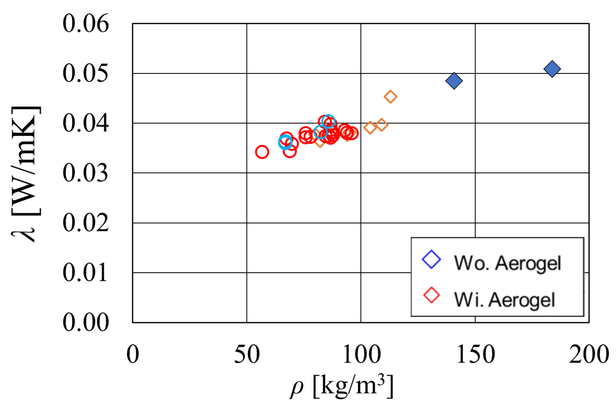

Figure 3: Behavior of CLC including aerogels, Influence of aerogels on thermal conductivity and density

Scale-up of Manufacturing Plant

Scale-up of individual process steps:

1. Gelation & Solvent exchange
   - New pilot plant: gelation & solvent exchange in in one tank
   - Target: 70 L per batch
   - Solvent recovery using distillation
2. Supercritical drying
   - Set-up of 64 L autoclave
   - Combined CO_2 recovery
   - Software for automatized drying under development

➢ 1st step towards industrial production

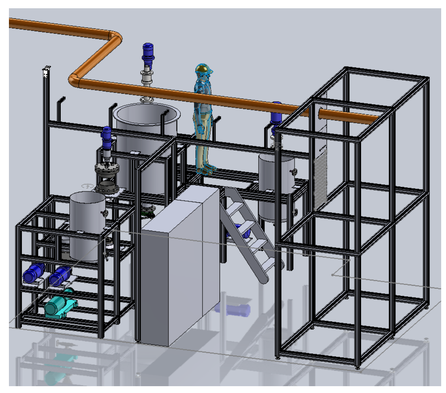

Figure 4: Scale-up at TUHH

Summary

- Improved thermal conductivity and density in prototypes
- Further analysis ongoing to determine best composition
- Scale-up plans expected to be achieved in 2023

➢ Implementation of new materials in living labs in 2023

This work is founded by iclimabuilt in Horizon 2020 and carried out in close collaboration with Aerogel-it, HTWK, TU Dresden and Rise.

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