Lucerne University of
Applied Sciences and Arts

HOCHSCHULE
LUZERN

Engineering and Architecture

FH Zentralschweiz

Analytical laboratory

Thermal and material analyses for research and industrial applications

Contact: Dr Anastasia Stamatiou
anastasia.stamatiou@hslu.ch
hslu.ch/tes

Analytical laboratory

The analytical laboratory of the Lucerne University of Applied Sciences and Arts, commissioned in 2014, allows the analytical characterization of a wide range of materials for researchers and external partners. External services include the performance of measurement series as well as the consulting on material characterization. In the case that further complex research questions arise, applied research projects can be arranged directly with the project partners.

The analytical laboratory is equipped with measuring instruments to determine thermal properties, such as heat capacity, temperature stability and thermal diffusivity. During such measurements, differential calorimetry (DSC), thermal gravimetric analysis (TGA), transient hot bridge, Fourier-transform infrared spectroscopy (FTIR) and other methods of analysis can be used. The laboratory also specializes in the characterization of particles and emulsions. Particle and droplet size distributions and emulsion stabilities can be identified, by using measuring instruments like Beckman Coulter, Sympatec HELOS and Lumisizer as well as microscopy.

Additional analytical devices and methods availabe include determination of density, viscosity (using a rheometer), chemical composition (via gas chromatography and FTIR) and viscoelastic properties (Dynamic Mechanical Analysis, DMA).

Based on this wide range of analysis methods, a large number of liquid and solid materials such as chemicals, metals and polymers from the fields of medical engineering, food technology, material engineering, environmental and energy technology can be analyzed.

Please do not hesitate to contact us if you have any questions.

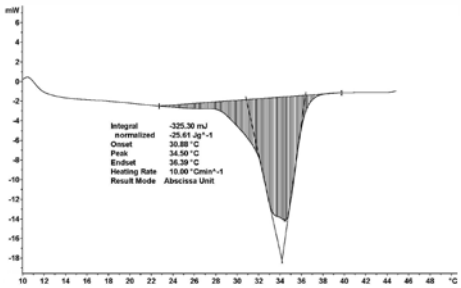
Dr Anastasia Stamatiou und Oliver Fellmann
Further information: www.hslu.ch/tes

Industrial and commercial analyses

Example: thermal cycling stability of chocolate

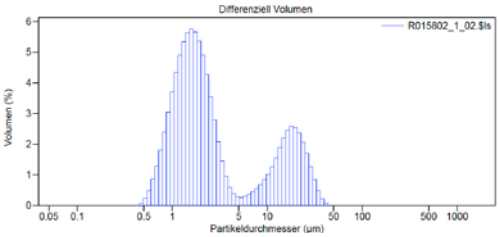
In the production process of chocolate biscuits, the firm dough is doused with melted chocolate. The liquid chocolate that does not stick to the biscuit is collected, heated back up and applied to the biscuit again. Recycling the chocolate in this way changes its composition.

Measuring the phase change temperature and enthalpy of the chocolate during crystallization using dynamic differential scanning calorimetry allows the determination of chocolate quality during thermal cycling to ensure no quality decline occurs.



Example: droplet size determinations for cosmetic products

Cosmetics are mostly powder and emulsion-based products. The quality and properties of cosmetics are heavily dependent on factors such as particle size, particle shape, rheology and stability.
High quality requirements and legal provisions necessitate the exact characterization of these properties. For example, the long-term stability of cosmetic emulsions can be analyzed with a great deal of accuracy through droplet size distribution.



Analyses for research purposes

Research on the important characteristics and physical properties of storage materials

The storage of thermal energy is always connected to materials. The Competence Center Thermal Energy Storage identifies and analyzes storage materials for different temperature ranges.

The characteristics and physical properties of different storage materials are of key interest for storage applications.

Cutting-edge measuring instruments are used in the analytical laboratory to measure the properties of materials.

The research focus lies amonst others on the analysis of phase-change materials (PCMs). Materials whose phase change from solid to liquid is used for storing thermal energy are known as PCMs. Such materials allow for stable temperature levels in high-precision applications as well as for high storage densities for energy storage applications.

Contact persons

Oliver Fellmann
Room E300 / E530
Technikumstrasse 21, 6048 Horw
Institute of Mechanical Engineering and Energy Technology
CC Thermal Energy Storage

Laboratory technician
T +41 41 349 38 05
oliver.fellmann@hslu.ch

Dr Anastasia Stamatiou
Room E300
Technikumstrasse 21, 6048 Horw
Institute of Mechanical Engineering and Energy Technology
CC Thermal Energy Storage

Senior Research Associate
T +41 41 349 32 97
anastasia.stamatiou@hslu.ch

Lucerne University of Applied Sciences and Arts – Engineering & Architecture

Where people and ideas meet

For 60 years, the Lucerne School of Engineering and Architecture has been dedicated to education, research and development in all areas of architecture and engineering. The bachelor's and master's degree programs on offer – plus the wide range of continuing and executive education programs – are based on current developments on the market. Thus, they make an important contribution to the education of young people and the continuing education of experienced professionals. Research and development – in particular in the focal points "Building as a System" and "Intelligent Solutions for the Energy Turnaround" – are carried out with great passion and expertise. Services in the form of consulting, expert reports and certification complete the offer range and make the Lucerne School of Engineering and Architecture a strong partner for the Swiss economy.

Competence Center Thermal Energy Storage

Institute of Mechanical Engineering and Energy Technology

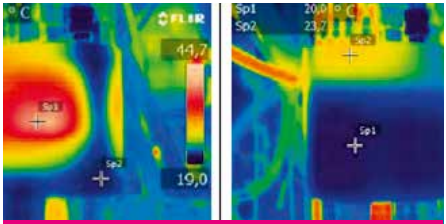
The Competence Center Thermal Energy Storage (CC TES) is the leading research partner for the storage of heat and cold as well as for high temperature stability requirements.

The CC TES characterizes, optimizes and develops materials, components and systems for building, industrial and energy supply applications.

Latent heat storage

Seasonal energy storage

Assessment of storage



Temperature stability

03-2018 / 150 Ex.