Zurich University
of Applied Sciences

School of
Engineering

IMPE Institute of Materials
and Process Engineering

Adhesives & Adhesive Technology

Synthesis, formulation and adhesive testing

The laboratory for Adhesives and Adhesive Technology covers the range from adhesive synthesis and formulation to adhesive testing and analysis of structure property relationships. The laboratory is equipped to investigate a broad range of adhesive technologies from adhesive dispersions and hotmelts to reactive systems.


Laboratory Coater / Laminator


Adhesive testing (90° peeltest)


Rheometer with plate/plate geometry

Synthesis and Formulation

Batch reactor

- Gravimetric feeding of monomers and/or initiato
- Collection and visualization of reaction data, Investigation of reaction progress by IR- probe spectroscopy

Microcompounder

- Microscale adhesive formulation (< 10 ml)
- Online investigation of viscosity and reaction progress

Speed mixer

- Fast formulation of reactive adhesives in small batches (10-50 ml)
- Efficient and fast mixing; Disposable mixing beakers

Laboratory Coater / Laminator

- Adhesive tape application via slot die coatin

Characterization

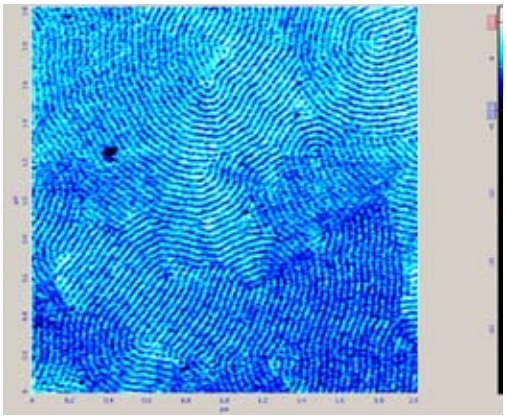
Adhesive performance

- Tensile test machine with a variety of adhesive testing tools: 90° peel test; 180° peel test; Climbing drum peel test (e.g. for honeycomb composite testing); Loop tack test according to ASTM and FINAT; Shear adhesion failure temperature (SAFT)

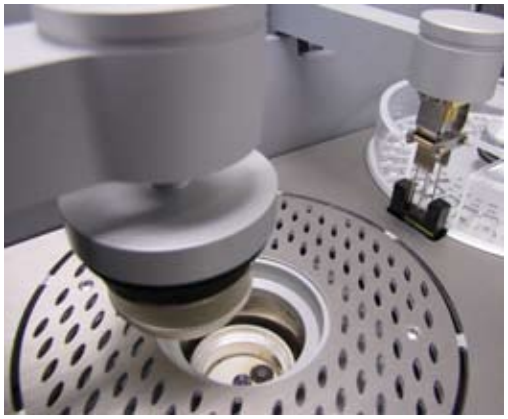
Rheology and Dynamic Mechanical Analysis

- Determination of flow properties of adhesives
- Rheological investigation on curing behaviour
- Combination of small angle light scattering and rheology for morphological investigations

Atomic force microscope (AFM)



AFM image of pressure sensitive adhesive formulation



Differential Scanning Calorimetry (DSC) equipped with Autosampler

Infrastructure

Rheology

Broad range of tools (cone plate, plate plate, Couette)
Coupling with small angle light scattering (SALS)
Temperature range: -150°C – 450°C

Thermal analysis

Differential Scanning Calorimetry (DSC)
Temperature range -150°C – 650°C (liquid N_2)
Coupled with UV source for UV curing adhesives
Thermogravimetry (TG)
Coupled with IR-Spectroscopy
Dynamic Mechanical Analysis

Microscopy

Scanning electron microscope (SEM)
Including energy dispersive analysis (EDX)
Atomic force microscopy (AFM)
Topographical and morphological characterization
Including a heating bench (temperature up to 150°C)
Light Microscope including digital imaging software

Laboratory scale batch reactor (1000 mL)

Precise torque measurement with stirrer (reaction monitoring)
Gravimetric monomer/initiator feeding
Software for electronic monitoring of reaction parameters

Microcompounder

Small scale mixing of adhesive formulations (10 ml)
Online viscosimetry
Online reaction monitoring by IR-probe spectroscopy

Spectroscopy

IR-spectroscopy including ATR
IR-microscopy
IR-probe spectroscopy (reaction monitoring)

Adhesive testing

90° peel test
180° peel test
Climbing drum peel test (e.g. for honeycomb composite testing)
Loop tack test according to ASTM and FINAT
Shear adhesion failure temperature (SAFT)

Surface characterization and modification

Goniometer: measurement of contact angles
Tensiometer
Low pressure Plasma treatment of surfaces

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