

Process Engineering

Functional Surfaces

Active surfaces are essential for many catalytic reactions and separation processes. Well defined inactive surfaces can be functionalised to receive the desired behaviour.

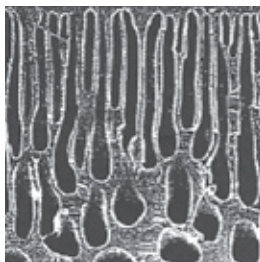
In the laboratory of Process Engineering of the Zurich University of Applied Sciences Winterthur (ZHAW) research and development is focused on mass transfer or catalytic chemical reactions at solid surfaces and diffusion through thin selective layers (2 μm or less). The main topics are:

Membrane processes

- Surface modification of micro porous membranes for pervaporation and vapour permeation



Selective layer
2 μm



Microporous membrane
70 μm



Supporting web
100 μm

- Membrane characterisation and module design



(Photo: Cella AG)

Seven modules in
an industrial
pervaporation plant

Simulated moving bed chromatography

SMB chromatography offers many advantages over conventional batch elution chromatography such as higher productivity due to continuous operation and an efficient entire use of the stationary phase as well as a reduction of the solvent consumption.



Knauer SMB
pilot plant at ZHAW

Fuel processing for fuel cells

In 1999 ZHAW started with fuel processing for solid oxide fuel cells by catalytic partial oxidation (CPO). Up to now CPO has been carried out with natural gas, liquid gas, biogas and heating oil.

Process Engineering

Infrastructure

The following infrastructure is available:

- general analytics:
gas chromatography, density measuring instrument, high performance liquid chromatography (HPLC), UV/VIS spectrometry,
- particle characterization:
coulter counter particle size and number analyser,
- thermal separation:
rectification plants in pilot and laboratory scale, reactors, drying ovens
- mechanical separation:
centrifuges, filter press
- chromatographic separation:
expanded bed adsorption, simulated moving bed chromatography
- membrane separation:
micro filtration, ultra filtration, pervaporation, long time pervaporation (up to months)
- mechanical mixing:
mixing reactor
- surface modification:
plasma activation, chemical functionalisation
- absorption pilot plant
- size reduction:
pin mill
- cell disruption:
bead mill, high pressure homogeniser
- fuel processing unit