



- 1 *Continuous fixed-bed reactor for synthesis of higher alcohols from ethanol.*
- 2 *Gas chromatography-mass spectrometry system (GC-MS) for product analysis.*

GREEN SURFACTANTS AND INTERMEDIATES FROM NON-PETROCHEMICAL SOURCES

Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT

Osterfelder Strasse 3
46047 Oberhausen, Germany

Dr.-Ing. Axel Kraft

Head of Department
Biorefinery and Biofuels
Phone +49 208 8598-1167
axel.kraft@umsicht.fraunhofer.de

Dr. rer. nat. Stefano Bruzzano

Head of Group
Chemicals and Formulations
Phone +49 208 8598-1415
stefano.bruzzano@umsicht.fraunhofer.de

www.umsicht.fraunhofer.de

Fraunhofer UMSICHT regards itself as a pioneer for sustainable energy and raw materials management. Together with its partners, the dedicated team researches and develops sustainable products, processes, and services.

The group "Chemicals and Formulations", as part of the department Biorefinery and Biofuels, focuses on process development for the production of chemicals and intermediates from non-petrochemical sources (e.g. ethanol, fats/oils, and sugars).

Our work includes process development and optimization inclusive related analytics with formulation development and own IP.

Keywords

- sustainable raw materials
- process development and optimization
- process-related and application analytics
- green surfactants
- know-how and support in licensing

Industrial Sectors

- detergent industry
- cosmetics industry
- personal and home care
- lacquer and varnish industry
- industrial cleaning
- agriculture industry



1



2

1 Source: MEV.

2 High pressure stirrer vessel reactor for hydrations and other reactions (up to 280 bar/300 °C).

Technological specification

Fraunhofer UMSICHT has a widely varied technical infrastructure such as reactors and pressure vessels of different materials (steel, glass, titan), protective gas and vacuum installations, utilization of special gases as well as automated laboratory equipment for continuous operation mode (mini-plants) which can be operated even at high temperatures (up to 280 °C and pressures (up to 100 bar) in 24/5 and 24/7 mode.

The equipment is complemented by small technical installations for the cleaning and concentration of product streams (rectification, extraction, crystallization, lyophilization, spray drying, short path distillation, cross flow ultrafiltration).

Fraunhofer UMSICHT holds IP in process control of diverse chemical reactions, e.g. (trans-) esterifications, hydrogenation, etherifications.

Our service

Development of catalytic processes, products and formulations of chemicals, including

- sample manufacturing (kg's)
- scientific analytical services
- specific application tests
- cost effectiveness studies-
- own intellectual property.

Process optimization with established process technology for organic surfactants like

- medium chain length alcohols (C₆-C₁₀) with methyl- or ethyl-branching made from on ethanol
- medium chain length secondary alcohols (C₇-C₁₀) with ethyl-branching made from on ethanol
- esterquats/esteramines
- sugar surfactants (APG, APP) made with medium chain alcohols (see above)
- partial glycerides
- (sulphonated) fatty acid esters¹
- sugar fatty esters¹
- ethoxylated products¹.

Your benefit

Faster time to pilot by using state-of-the-art pilot facilities (24/5 and 24/7) with on-site off-line and at-line expert analytics.

Fast track to catalyst screening and (purified) samples for market entry and customer evaluations.

Easy access to highly qualified cross-functional teams of engineers, chemists and sustainability experts.

Easy and low-risk access to new technologies and IP (open innovation).

Access to leading-edge know-how about new pathways for innovative and sustainable raw materials.

Assessment of sustainability employing standardized LCA-analyses done in-house as well.

¹ on request and via third party, respectively