

PRESS RELEASE

PRESS RELEASEMay 3, 2018 || Page 1 | 3

Innovative process for environmentally friendly manure treatment comes onto the market

The BioEcoSIM process for the treatment of liquid manure developed at the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB is being introduced to the market by SUEZ Germany as an operator of large-scale plants. This creates an opportunity for farms to dispose of surplus manure and digestate. Slurry treatment products are phosphate fertilizers, ammonium fertilizers and organic soil improvers. The partners will announce their cooperation for the market launch at IFAT from May 14 – 18 in Munich.

Around 200 million cubic meters of liquid manure from livestock farming and digestate end up in fields and meadows in Germany every year. More than 90 percent of the "black gold" consists of water and contains considerable amounts of the important plant nutrients nitrogen and phosphorus. However, if more liquid manure is applied to the fields than the soil can bind and plants can absorb, microorganisms convert the ammonium nitrogen in the soil into nitrate that seeps into the groundwater. The problem: Where large quantities of liquid manure are produced, there is often a lack of arable land that needs to be fertilized. For this reason, fattening farms use so-called slurry exchanges to order tankers to transport their slurry to areas requiring nutrients – often several hundred kilometers away.

With the BioEcoSIM process, the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB has developed an environmentally friendly solution. "We have combined various processing steps into an overall process and integrated them in a technical plant," Dr. Iosif Mariakakis, the Fraunhofer IGB nutrient expert, explains. This allows the valuable nutrients to be recovered as easily transportable and precisely metered phosphorus and ammonium fertilizer salts. The solid organic components are also recycled by drying and conditioning using an energy-efficient process. They are then available in the form of humus-forming soil improvers. Farm slurry is thus almost completely recycled and the recycled components are returned to the soil.

Large-scale implementation and operator model

With SUEZ Germany, Fraunhofer IGB has now gained a licensee. The globally operating waste recovery and recycling company will invest in processing plants as operator. "Gradually, large-scale technical facilities are to be built, on a nationwide basis, to take surplus manure from farmers, breeding and fattening farms. Especially the logistical aspects of delivery will be taken into account when selecting the plant locations," says Kai Bastuck, Head of Recycling and Recovery Business Unit Development at SUEZ Germany, describing the business model. "By recovering the finite raw material

phosphorus, Germany's dependence on phosphorus imports is reduced. This conserves finite phosphorus resources and reduces pollutant inputs into soils. In this way, we contribute to a sustainable future and turn nutrients into valuable substances," says Bastuck. Fraunhofer IGB supports SUEZ Germany in the further development of the process.

PRESS RELEASE

May 3, 2018 || Page 2 | 3

A first processing plant with a turnout of one cubic meter per hour is currently being built as a "Living Pilot Plant" at SUEZ's Zorbau site in Saxony-Anhalt. The flexibly designed plant will process cattle and pig manure, but also fermentation residues from biogas plants, and thus serve as a blueprint for further large-scale plants.

"An average industrial-scale plant then produces about 100 kilograms of phosphate fertilizer, 100 kilograms of nitrogen fertilizer and 900 kilograms of organic, nutrient-poor solids per hour from ten cubic meters of raw slurry," explains Siegfried Egner, Head of Department at Fraunhofer IGB. The potential savings in synthetic fertilizers are enormous. With a capacity of one million cubic meters of liquid manure per year, a plant can produce 10,000 metric tons of ammonium fertilizer and 10,000 metric tons of phosphate fertilizer.

The BioEcoSIM process

Various process steps are necessary to completely process liquid manure. In a first step, the aqueous liquid manure is pretreated so that the phosphorus is completely dissolved. It is separated into a solid and a liquid phase by two-stage filtration.

The dewatered solid phase is dried using an energy-efficient process, developed at Fraunhofer IGB, which operates with superheated steam in a closed system and is therefore particularly energy-efficient. The dried organic components can optionally be further converted to organic biochar at 450°C via a pyrolysis step – as in the drying step in an atmosphere of superheated water vapor.

The liquid manure fraction contains the dissolved inorganic nutrients. In a precipitation reactor, phosphorus is first recovered and precipitated and filtered off as calcium phosphate, magnesium phosphate or magnesium ammonium phosphate. Nitrogen is recovered in a second step. For this purpose, the aqueous fraction is separated as ammonium sulfate by means of membrane distillation, and crystallized. What remains is water that contains only traces of phosphorus and nitrogen but is rich in potassium; this can best be used for irrigation purposes.

In extensive investigations and field studies, it was shown that the mineral fertilizers and organic soil improvers prepared from farm slurry can be used directly as readily available fertilizers and humus-forming substrates in agriculture.

FRAUNHOFER INSTITUTE FOR INTERFACIAL ENGINEERING AND BIOTECHNOLOGY IGB

The concept for processing manure was proven within the BioEcoSIM project, which was funded by the 7th EU Research Framework Program from October 2012 to December 2016.

PRESS RELEASE

May 3, 2018 || Page 3 | 3

Presentation at IFAT

At IFAT 2018, the partners will be available in Munich from May 14–18 to provide further information and for discussions: Fraunhofer IGB at the Fraunhofer joint stand in Hall B2, Booth 215/314, SUEZ Germany in Hall A6, Booth 239.



The BioEcoSIM process supplies both mineral ammonium and phosphorus fertilizers, and humus-forming soil improvers.

(© Fraunhofer IGB) |

**Picture in color and printing quality:
www.igb.fraunhofer.de/press**

Reprints free of charge. A voucher copy is appreciated in case of publication.

Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB | Nobelstrasse 12 | 70569 Stuttgart | Germany | www.igb.fraunhofer.de

Contact R&D Department

Dr.-Ing. Iosif Mariakakis | | Phone +49 711 970-4231 | iosif.mariakakis@igb.fraunhofer.de

Contact Press

Dr. Claudia Vorbeck | Phone +49 711 970-4031 | claudia.vorbeck@igb.fraunhofer.de

The **Fraunhofer-Gesellschaft** is the leading organization for applied research in Europe. Its research activities are conducted by 72 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of more than 25,000, who work with an annual research budget totaling 2.3 billion euros. Of this sum, almost 2 billion euros is generated through contract research. Around 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

The **Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB** develops and optimizes processes, technologies and products in the fields of health, chemistry and process industry, as well as environment and energy. We combine the highest scientific standards with professional know-how in our competence areas – always with a view to economic efficiency and sustainability. Our strengths are offering complete solutions from the laboratory to the pilot scale. Customers also benefit from the cooperation between our five R&D departments in Stuttgart and the institute branches located in Leuna and Straubing. The constructive interplay of the various disciplines at our institute opens up new approaches in areas such as medical engineering, nanotechnology, industrial biotechnology, and environmental technology.