Perspectives on using pulse electric field to enhance biogas yield in anaerobic digestion

July 2, 2015 – The usage of pulsed electric field for conditioning substrates can significantly enhance biogas yield in commercial biogas plants. Although the primary effect of the electric field is cracking cell structures for better availability of nutrition, other effects like shockwave, electrophoresis or influence on the metabolic condition of cells can play a role. The aim of this review is the presentation of possible effects and a judgement in terms of economic factors like biogas yield and hydraulic retention time.

Possible arrangement of electric treatment within the biogas process: High pulse energies are for raw substrate treatment yielding a high level of cell killing and disintegration while moderate pulse protocols are used for recirculate where the focus lies on the control of the microbial community.

The technology was developed for treatment of food in the 50ties of least century and adapted for the treatment of waste water (OpenCeL, Atlante, CA; Innovum, Höchst, Austria). Lab scale studies but also experiments in production plants showed a significant enhancement of biogas yield for electrically treated substrate like manure or maize silage. Due to the very complex biogas process, a high variability of the gas yield makes any prediction of the economic effect of electrical treatment dazzling.

In order to optimize for the action of the electric field on the biogas process comprehensive studies on pilot plants but also on small lab reactors are conducted. Besides monitoring of biochemical quantities, the microbial community is investigated as well. This gives deeper understanding of the direct action of the electric but gives also an opportunity of quantitative judgement of side effect.

Corresponding author for this study in TECHNOLOGY is Uwe Pliquett, uwe.pliquett@iba-heiligenstadt.de
About TECHNOLOGY
Fashioned as a high-impact, high-visibility, top-echelon publication, this new ground-breaking journal — TECHNOLOGY — will feature the development of cutting-edge new technologies in a broad array of emerging fields of science and engineering. The content will have an applied science and technological slant with a focus on both innovation and application to daily lives. It will cover diverse disciplines such as health and life science, energy and environment, advanced materials, technology-based manufacturing, information science and technology, and marine and transportations technologies.

About World Scientific Publishing Co.
World Scientific Publishing is a leading independent publisher of books and journals for the scholarly, research and professional communities. The company publishes about 500 books annually and more than 120 journals in various fields. World Scientific collaborates with prestigious organisations like the Nobel Foundation, US National Academies Press, as well as its subsidiary, the Imperial College Press, amongst others, to bring high quality academic and professional content to researchers and academics worldwide. To find out more about World Scientific, please visit www.worldscientific.com.