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HUMAN & BIOTECHNOLOGY

Fields of Expertise TU Graz

Gernot Müller-Putz, Human & Biotechnology
Source: Lunghammer – TU Graz

The current issue of TU Graz research focuses on biotechnology. Represented by five core institutes at our university, research in this field explores important molecular-cellular biosystems and applications of them in the context of modern bioproduction. Biotechnology research at TU Graz is strongly interconnected with chemistry, process engineering and informatics.

50 years ago, in 1971, a new field of research was established at TU Graz: biomedical engineering. Starting as a major of electrical engineering, today it is a standalone study with Bachelor's and Master's degree programmes and even its own doctoral school for PhD students. The research started in a single, large institute (Elektro- und Biomedizinische Technik), which was split into separate institutes. After several developments, today, there are five institutes located in the Faculty of Computer Science and Biomedical Engineering: Medical Engineering, Biomechanics, Health Care Engineering with European Testing Center for Medical Devices, Neural Engineering and Biomedical Informatics. All Institutes have found their home in the Biomedical Engineering Building in Stremayrgasse 16.

Later this year (from 30 September to 1 October 2021) we are hosting the Annual Conference of the Austrian Society of Biomedical Engineering and are celebrating this anniversary (https://oegbmt2021.tugraz.at). We have invited keynoters and there will be talks about current scientific findings in the field.

Calls for appointments: Professorship in Biomedical Imaging, §98, successor to Rudolf Stollberger is currently in its negotiation phase. The Professorship in Computational Medicine, §98, could not be filled and a new call has been postponed. We will continue to report here.

Regina Kratzer

CO_2 and Lignocellulosic Biomass as Feedstocks for Upcoming Biotechnology

Nature provides an eco-friendly alternative for almost any chemical reaction but examples of industrial bioprocesses are rare. The main reasons for slow implementation of bioprocesses are the generally more labor-intensive development and more expensive feedstocks and process steps compared to chemical processes. For bulk products (e.g. biofuels, biopolymers) the feedstock contributes to >70% of the total production cost. The exploration of waste streams as feedstocks is the required boost to further exploit modern biotechnology. Use of carbon dioxide (CO_2) as feedstock opens the door to a vast number of bioproducts.

CO_2 is the only carbon source that can quantitatively replace fossil fuels. However, CO_2 is a stable molecule and high energy input in the form of temperature, electricity, light or reactive reagents is required to transform CO_2. In biotechnology, there are three main routes of using CO_2 as feedstock (i) directly as carbon source for specialized microorganisms, (ii) as biomass subsequently to CO_2 fixation by plants, (iii) after chemical transformation to e.g. formic acid or methanol (Figure 1). We, at the Institute of Biotechnology and Biochemical Engineering, have been taking a closer look at the efficient conversion of CO_2 used directly as feedstock and, subsequently to assimilation by plants, as lignocellulose. The utilization of CO_2 or lignocellulosic waste circumvents the food vs. fuel debate as it is the case with e.g. corn, sugar cane or vegetable oil feedstocks.

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