
Industrial Biotechnology (IB)

Development of Swiss Biotechnology Beyond the Biopharmaceutical Sector – a joint activity of the Swiss Biotech Association (SBA) and the Swiss Academy of Engineering Sciences (SATW)

Starting position

Eighty-five percent or CHF 98 billion of chemical & pharmaceutical exports are contributed by the life sciences subsector, and more than a third of exports from this subsector are derived from so-called biopharmaceutical products (e.g., monoclonal antibodies). Industrial white biotechnology shows major business potential, and biotechnological processes offer methods of sustainable manufacturing which are presently not being exploited optimally. Biosynthesis will become the “archetypal” manufacturing process for many organic chemicals, and biotransformation remains key to the specific functionalization of this process. New value chains and microbial production methods will emerge based on rational metabolic and cellular engineering and will culminate in synthetic microbial life – a development that will open exciting new business opportunities.

Goal

Switzerland should capitalize on the success of red biotechnology (biopharmaceuticals) and establish a strong and well-connected industrial biotechnology community with a clear vision regarding areas of interest, strategic research and education agendas and an action plan. Success is a question of “brains” and not of raw materials or infrastructure. However, the Swiss industrial biotech sector must be consolidated. The focus should be on products that are relevant for the Swiss economic space, such as small molecule pharmaceuticals, intermediates, fine chemicals, biochemicals and other specialties. Similar to the biopharmaceuticals sector, the industrial biotech sector should become a similar or perhaps even larger contributor to the Swiss gross national product in the long term. The life science markets represent the key markets to be addressed, and the specific industries that should be addressed are those of organic chemicals, flavour and fragrances, cosmetics, dietary supplements, and feed and food, as well as other related industries. However, other markets and products must also be included, such as the biopolymers of MedTech, just to mention an example.

Scope

The scope of this joint SBA & SATW activity will be narrowed down to specific products and industrial processes using the suspension culture of prokaryotic and eukaryotic cells. Agricultural production methods, including PMP (plant-made pharmaceuticals), are not within the scope of this study. Additionally, the biobased economy and the circular economy are not the primary subjects of this investigation, although they are connected. However, we will coordinate with those bodies (e.g., SKB and science-industries) to contribute to our collected data, targeting these topics specifically.

Working method and Kick-off meeting

The following agenda will be pursued to recognize and realize the value of industrial biotech for the Swiss economy:

1. Complete an IB directory of stakeholders, production capabilities and innovation needs, using the SBA Swiss Biotech Directory platform as a connection and information tool. Establish a transparent and clearly visible IB segment on the SBA homepage to act as an information broker.
2. Rethink the way we cooperate to integrate new IB products and processes. Provide insights and required data regarding related topics (such as the bio-based economy and the circular economy).
3. Facilitate access to project funding for interested industrial partners.
4. Identify promising fields and future disruptive developments (e.g., next-generation protein-based designer polymers) and strengthen the synthetic biotechnology cooperation within Switzerland.
5. Bring interested key players together to lay the foundation of a strategic paper in a kick-off meeting planned for October 2020.

Definition of industrial biotechnology

There are numerous definitions for industrial biotechnology as well as more-or-less frequently used synonyms such as white biotechnology, third-wave biotechnology, sustainable chemistry, and green chemistry.

EuropaBio: *“Industrial biotechnology uses enzymes and microorganisms to make biobased products in sectors that manufacture goods such as chemicals, food and feed, detergents, paper and pulp, textiles and bioenergy. In doing so, it uses renewable raw materials and is one of the most promising, innovative approaches to lowering greenhouse gas emissions.”*

Merriam-Webster defines industrial biotechnology as *“the manipulation (as through genetic engineering) of living organisms or their components to produce useful products that are usually used commercially (such as pest-resistant crops, new bacterial strains, or novel pharmaceuticals)”*.

Further reading

[1] CHIMIA (2020) 74(5):345-359, doi: 10.2533/chimia.2020.345

[2] Swiss Biotech Report 2020

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