EDITORIAL

Engineering mindset for Life Sciences and Biotechnology

With new tools developed for analyzing and engineering biological parts and systems, such as genome sequencing and editing, a new era of engineering biology is emerging along different fronts, ranging from basic biology and biomedicine to more application-orientated synthetic biology. One of the key issues of this new era of engineering biology is how to design and build biological systems (or processes) from known parts, which can be at the level of genes, proteins, metabolic and signaling pathways, or cells. To harness the potentials and promises of the rapid developments in new tools and mechanistic understanding of basic biology, corresponding innovations in engineering in literal sense of the word are desperately needed, i.e. quantitative description and holistic engineering (design-built-test cycle, ideally guided by mathematic models) of biological parts and systems.

The journal *Engineering in Life Sciences* (ELS), with its root in biochemical and bioprocess engineering, addresses the needs mentioned above by focusing on engineering principles and innovations in life sciences and biotechnology. Life sciences and biotechnology covered in ELS encompass the use of biomolecules (e.g. proteins/enzymes) and cells (microbial, plant and mammalian origins) for biosynthesis, biotransformation, cell-based treatment, and bio-based solutions in industrial and pharmaceutical biotechnologies as well as in biomedicine. To cope with the new developments and needs, and to more clearly place its focus, the editorial team of ELS has recently reformulated the Aims and Scope and is taking measures to shape its future development.

We believe that for many of the promising and challenging issues in Life Sciences and Biotechnology, it is particularly important to have truly interdisciplinary collaborations among biologists, biotechnologists and engineers. Thus, ELS particularly aims to promote interdisciplinary collaborations for quantitative understanding and engineering of biological systems and processes in the different application areas. Applying this engineering mindset, ELS especially welcomes manuscripts addressing scientific questions and technologies ranging from very fundamental engineering understanding to design of bioproduction processes, including:

- Engineering electron transfer for biosynthesis and biotransformation (e.g. in photo- and electro-biotechnology)
- Developing quantitative tools for the engineering of biomolecules (e.g. DNA/genome, RNA and proteins) and bioproduction chassis

- Accessing novel biomolecules and biomaterials (e.g. proteins, natural and aromatic compounds, fine chemicals and building blocks)
- Engineering metabolic pathways and their regulation (e.g. in the context of metabolic engineering and synthetic biology)
- Unraveling cellular regulation and cell-to-cell interactions (e.g. microbiome, co-cultures, stem cells and tissues)
- Engineering novel bioreactors and bioprocesses (e.g. for the production of biopharmaceuticals, fine chemicals, commodities and biofuels, including use of waste streams and alternative feedstocks)

As such, the journal ELS covers the whole range of modern biochemical engineering and biotechnology, comprising biomolecular, bioprocess, metabolic and biosystems engineering.

As part of the efforts to enforce the aims, we are pleased to announce the appointment of Prof. Dr.-Ing. Ralf Takors from the University of Stuttgart as Deputy Editor-in-Chief. Prof. Takors has been a member of the Editorial Board and Guest Editor of ELS for many years. Since 2016, he additionally served the journal as a Section Editor. He is an expert in the areas of systems metabolic engineering and bioprocess development from lab- to industrial scale, focusing on industrially relevant microbes and mammalian cells. He has gained Dr.-Ing. in *Biochemical Engineering* (1997), 'Habilitation' in *Metabolic Engineering* (2004) and joined industry (company Evonik, Germany) from 2004 until June 2009. Since then, he is heading the institute of biochemical engineering (Institut für Bioverfahrenstechnik) at University of Stuttgart, Germany.

With this new roadmap for *Engineering in Life Sciences*, we are looking forward to the future developments in biotechnology, together with our authors and readers.

The ELS editor team

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