Discipline: Bioengineering

Title: From exploring microbial physiology and understanding molecular principles towards exploiting this knowledge in synthetic biology engineering

Abstract: We perform research in the fields of molecular and synthetic microbiology, focusing on a variety of microorganisms - bacteria, archaea and fungi - with a special interest for extremophiles. Model organisms studied in our group are Escherichia coli, the well-known bacterial model, Thermus thermophilus, a thermophilic bacterium, Sulfolobus acidocaldarius, a thermoacidophilic archaean and Ganoderma lucidum, a biotechnologically interesting filamentous fungus for the production of mycelium materials. A fundamental research objective is to obtain insights into how microorganisms adapt gene expression programs in response to environmental stimuli. We perform detailed investigations of the functions and molecular mechanisms of regulatory elements (transcription factors, RNA elements) using integrated genomic, genetic, biochemical, biophysical and structural approaches. As such, we aim to advance our understanding of how microorganisms respond to stress conditions such as temperature stress or nutritional shifts. These insights are not only relevant in the context of the natural microbial habitats, but also in that of bioreactors. As such, our fundamental research results are translated towards the engineering of novel microbial cell factories by constructing synthetic gene circuits bottom-up. Synthetic biology toolboxes (fluorescent reporters, promoter libraries, biosensors, ...) are being developed that help us in the development of novel (industrially relevant) microbial hosts for the biobased production of fuels, chemicals and materials in the context of the transition towards a sustainable bio-economy. We offer a dynamic and well-equipped research environment for state-of-the-art research in molecular and synthetic microbiology and are interested in supporting the preparation of a competitive application for a MSCA postdoctoral fellowship in case a perfect synergy can be created between the research profile and ambitions of the candidate and the above-explained research mission statement of the host research group.

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