ACS SyntheticBiology
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STEFANIE FRANK

Jason Dodds

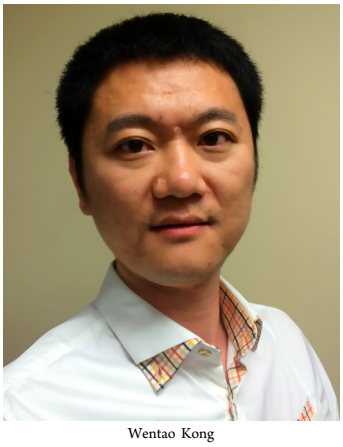
Current Position. Leverhulme Early Career Fellow, School of Biosciences, University of Kent, Canterbury, U.K.

Education. Ph.D. in Biochemistry at Queen Mary, University of London, U.K. Advisor: Prof. Martin Warren.

Nonscientific Interests. When I am not out and about with my three little girls, I enjoy swimming, dancing, cinema, and theater.

My research interests are focused on combining metabolic pathway engineering, protein structure/function analysis, and imaging tools to study biosynthetic pathways in bacterial cells. I am particularly interested in metabolic activities that are contained in protein shells; and the function, assembly, and spatial arrangement of such so-called bacterial microcompartments. The potential for engineering these intriguing structures is increasingly recognized. Our paper provides proof of principal that bacterial microcompartments can be stripped of their native metabolic enzymes and developed into bioreactors, which are adaptable for metabolic processes of choice. My work is aimed at expanding the understanding of the construction of such bioreactors, ultimately for the production of valuable compounds in bacteria. In the future, I would like to strive further into the fast growing world of prokaryotic cell compartmentalization to expand the current knowledge of how prokaryotic cells work. (Read Frank's article; DOI: 10.1021/sb4001118).

WENTAO KONG



Wentao Kong

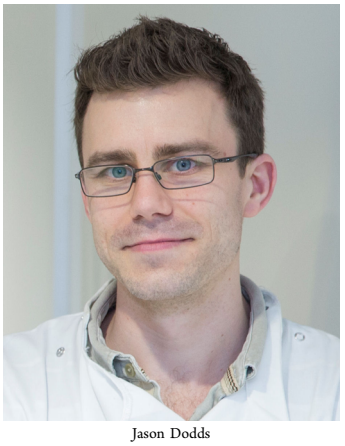
Current Position. Postdoctoral fellow, Department of Bioengineering, University of Illinois at Urbana−Champaign. Advisor: Dr. Ting Lu.

Edication. Ph.D. in Microbiology, Shandong University, China. Advisor: Jian Kong; B.S. in Biological Science, Shandong University, China.

Nonscientific Interests. I enjoy traveling, cooking, and gardening.

My research interest focuses on developing new methodologies for the engineering of lactic acid bacteria (LAB) and applying them for novel applications in food and pharmaceutical industries, such as their starter cultures and live vaccines. My Ph.D. work involved the construction of food-grade expression systems for LAB, antigen delivery vehicles for the development of oral vaccines, and enzymatic synthesis of prebiotics. Currently, I'm working on the development of new synthetic biology tools for LAB and their application for bacteriocin biosynthesis in *Lactococcus*. In this paper, we successfully transplanted a whole nisin gene cluster to a new host and optimized the culture for 6 times of increase of its nisin productivity via multistep optimizations. We achieved this goal by employing new tools that are more efficient than traditional approaches such as of medium and fermentation condition optimizations. Looking forward, I hope to continue my exploration in new applications of LAB for human health by using powerful synthetic biology tools. (Read Kong's article; DOI: 10.1021/sb500225r).

ANDREW D. LAWRENCE



Jason Dodds

Current Position. Postdoctoral research associate, School of Biological Sciences, University of Kent, Canterbury.

Education. Ph.D., Queen Mary, University of London. Advisor: Martin Warren; B.Sc., Biochemistry and Chemistry, University of Southampton.

Nonscientific Interests. Skiing, music, cooking, golf, travel, and diving.

My research to date has been directed toward the study of complex metabolic pathways. In particular, it has focused on our understanding and the manipulation of pathways through the application of synthetic and chemical biology methodologies. The metabolism of 1,2-propanediol occurs within a bacterial microcompartment (BMC). BMC's are proteinaceous shells that encapsulate the enzymatic

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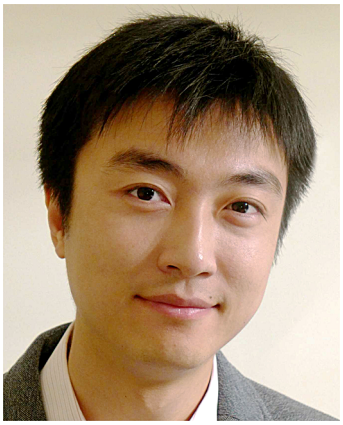
machinery required to perform a specific function. The encapsulation of an enzyme is mediated by a short peptide sequence, which interacts with the shell. In this paper we have used NMR to determine the solution structure of a BMC targeting peptide and to provide molecular detail on the interaction with the shell proteins. Using these targeting peptides it has been possible to re-engineer a novel BMC that is capable of producing ethanol from pyruvate. (Read Lawrence's article; DOI: 10.1021/sb4001118).

YUHENG LIN



Meimei Xu

Current Position. Ph.D. Candidate, College of Engineering, University of Georgia, Athens, GA. Advisor: Prof. Yajun Yan.

Education. M.S. in Microbiology at Chinese Academy of Sciences, Beijing, China. B.Eng. in Bioengineering at China Agricultural University, Beijing, China.

Nonscientific Interests. I love badmiton, soccer, and fishing.

My research is focused on the development of enzymatic and microbial platforms for the cost-effective production of biofuels, bulk chemicals, and pharmaceuticals. My projects involve multiple disciplines including biochemistry, molecular biology, microbiology, metabolic engineering, and synthetic biology. In this paper, we report the efficient microbial production of 5-hydroxytryptophan (5-HTP), a clinically effective anticoagulant, via combinatorial protein and metabolic engineering approaches. The 5-HTP producing strains were engineered to be capable of utilizing endogenous tetrahydromonapterin (MH4) as a coenzyme in the presence of a foreign MH4 recycling mechanism. Finally, de novo biosynthesis of 5-HTP from glucose was achieved, which demonstrates great potential for its scale-up production. (Read Lin's article; DOI: 10.1021/sb5002505).

SERGIOS A. NICOLAOU

Olga Nicola

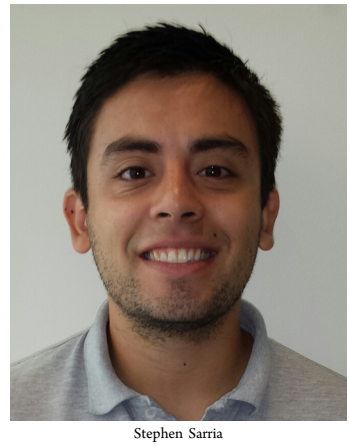
Current Position. Postdoctoral fellow, Department of Chemical and Biomolecular Engineering, University of Delaware. Advisor: Prof. Eleftherios Terry Papoutsakis.

Education. Ph.D. Chemical Engineering, University of Delaware (2013). Advisor: Eleftherios Terry Papoutsakis. B.Sc. Chemical Engineering, University of Texas–Austin (2006).

Nonscientific Interests. Travel, reading, food, and music festivals.

My Ph.D. work focused on the generation and screening of genomic libraries to improve complex phenotypes and increase the value of the biocatalysts used in chemical production. We generated a system of coexisting and coexpressing genomic libraries to allow for the simultaneous screening of two distinct libraries, with different DNA inserts, in a single host. This work was extended here, whereby a known genomic fragment that enhances alcohol tolerance was used as one insert and was paired with a *Lactobacillus plantarum* genomic library to increase the heterologous genomic space and identify genes that can increase alcohol tolerance further. My postdoctoral work included the screening of genomic libraries to increase tolerance to other stressors, including hydrogen peroxide. I am greatly interested in the engineering of biological catalysts to both increase their production capabilities, and their tolerance to the chemicals produced to facilitate higher yields. (Read Nicolaou's article; DOI: 10.1021/sb400156v).

STEPHEN SARRIA



Stephen Sarria

Current Position. Ph.D. candidate, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA. Advisor: Dr. Pamela Peralta-Yahya.

Education. B.S. in Biology, Southern Polytechnic State University, Marietta, GA.

Nonscientific Interests. I enjoy watching sports like basketball, soccer, and football. I also like to do a lot of outdoor activities such as playing soccer, hiking, and cycling.

My research interests involve the microbial production of chemicals of interest such as biofuels. Particularly, I am interested in the biosynthesis of these useful natural products at the enzymatic level and the construction of biosynthetic pathways that produce biofuels in microbial workhorses such as *E. coli* and *S. cerevisiae*. In this work, we established a microbial platform for producing the natural product pinene which is a precursor to a biosynthetic tactical fuel. We were able to produce pinene in *E. coli* and deduce the roadblock in our system. Further engineering of the pinene synthase in our system would be required to relieve substrate inhibition and subsequently increase pinene titers. This study opens up an avenue for protein engineering to both

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improve production of pinene and understand the protein level regulation of pinene synthase. (Read Sarria's article; DOI: 10.1021/sb4001382).

TSUTOMU TANAKA

Tsutomu Tanaka

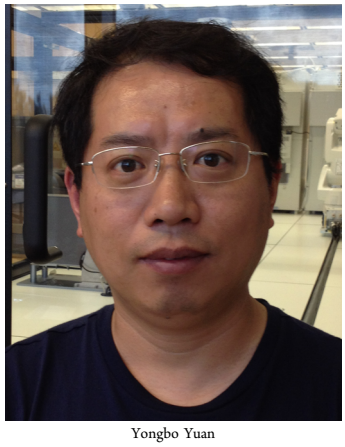
Current Position. Associate Professor, Department of Chemical Science and Engineering, Graduate School of Engineering, Kobe University.

Education. Ph.D. Department of Chemistry and Biotechnology, The University of Tokyo (2006). Advisor: Prof. Teruyuki Nagamune. B.S. Department of Applied Chemistry, The University of Tokyo (2001).

Nonscientific Interests. Traveling, enjoy drinking.

Enzyme engineering was my Ph.D. focus while my current research interest is cell surface engineering for creating microbial cell factories. Synthetic biology expands variety of valuable compounds production and cell surface engineering enables assimilation of many types of biomass. In this paper, we created two kinds of cellulase-displaying *E. coli* strains. Growth ability on cello/xylooligosaccharides mixture was higher compared to monomeric sugar mixtures. Currently, we are working on creating novel cell factories by engineering both the inside and outside of cells. (Read Tanaka's article; DOI: 10.1021/sb400070q).

YONGBO YUAN



Yongbo Yuan

Current Position. Postdoctoral fellow, Institute for Genomic Biology, University of Illinois at Urbana−Champaign. Advisor: Dr. Huimin Zhao.

Education. Ph.D. Biochemical engineering, Saarland University, Saarbrucken, Germany (2010). Advisor: Elmar Heinzle; Masters in Biochemical Engineering, University of Science and Technology Beijing (2007); B.S. Northeastern University (1999), China.

Nonscientific Interests. I am a big fan of fishing. Other than fishing, I like outdoor sports such as cycling and hiking.

My Ph.D. work was focusing on metabolic network activity characterization using mass spectrometric methods. I developed metabolic flux analyses for large scale fermentation using GC-C-irMS, as well as methods for quantification of small molecular mass metabolites using MALDI-TOF-MS and for *in situ* enzyme activity measurement. After graduation, I engineered strains (yeast and *E. coli*) for improved desired phenotypes, like sugar utilization and alcohol tolerance, by introducing/optimizing heterologous genes/pathways. My current research is focused on developing scalable, automated and high-throughput DNA assembly protocols for construction and modification of large DNA molecules in metabolic engineering/synthetic biology. (Read Yuan's article; DOI: 10.1021/sb400156v).

KYLE ZINGARO

Alison Zingaro

Current Position. Upstream Development Scientist, Alexion Pharmaceuticals, Cheshire, CT.

Education. Ph.D. Chemical Engineering, University of Delaware (2013). Advisor: E. Terry Papoutsakis. B.S. in Biochemistry, Virginia Tech (2007)

Nonscientific Interests. Spending time with my new baby girl, Eleanor Katheryn, my wife, Alison, and our dog, Franklin.

My doctoral research centered on the development of the complex phenotypes of solvent tolerance and solvent production in *E. coli*. Solvent tolerance is an industrially relevant phenotype that is critical for the development of microbial biofuel and biochemical production. This paper represents the culmination of that work in that it combines previously explored heat shock proteins as overexpression targets for improving tolerance with a library based approach for identification of heterologous genomic elements. Thus, using a combination of rational design with a targeted directed evolution approach complex, multigenic phenotypes can be rapidly developed. I am currently working on development and scale-up of mammalian cell culture and production of beneficial biologic therapies. (Read Zingaro's article; DOI: 10.1021/sb400156v).