ACS SyntheticBiology

Introducing Our Authors

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JAMES M. CLOMBURG

Image courtesy of James Clomburg

Current Position. Postdoctoral Research Associate, Department of Chemical and Biomolecular Engineering, Rice University, Houston, TX. Advisor: Prof. Ramon Gonzalez.

Education. Ph.D. in Chemical and Biomolecular Engineering, Rice University, Houston, TX (2012); Advisor: Prof. Ramon Gonzalez. B.S. in Chemical Engineering, University of Texas, Austin, TX (2006).

Nonscientific Interests. Sports of all kinds (especially golf), music, and spending time with family and friends

My research interests include the understanding and harnessing of cellular metabolism with the specific goal of developing technologies for the sustainable production of fuels and chemicals. My Ph.D. thesis focused on understanding fermentative glycerol metabolism in *Escherichia coli*, which enabled the development of various metabolic engineering and synthetic biology strategies for the conversion of glycerol into various fuels and reduced chemicals. Currently, my work is focused on the reconstruction and quantitative characterization of a functional reversal of the β-oxidation cycle for the production of advanced fuels and chemicals. As described in this paper, the exploitation of a reversal of the β-oxidation cycle is a promising pathway for carbon−carbon elongation, and with the identification and assembly of the key functional components we have demonstrated a bottom up/synthetic approach enabling the production of a variety of carboxylic acids. (Read Clomburg's article; DOI: 10.1021/sb3000782)

YAN KUNG

Image courtesy of Yan Kung

Current Position. Postdoctoral Researcher, Joint BioEnergy Institute, Lawrence Berkeley National Laboratory, Emeryville, CA. Advisor: Prof. Jay D. Keasling.

Education. Ph.D. in Biological Chemistry, Massachusetts Institute of Technology, Cambridge, MA (2011); Advisor: Prof. Catherine L. Drennan. B.A. in Chemistry, Colby College, Waterville, ME (2005).

Nonscientific interests. Listening to music, watching movies, and traveling the globe

My Ph.D. work focused on the structural elucidation of metalloenzyme complexes involved in acetogenic carbon fixation. Using X-ray crystallography, I solved structures of large, multimodular complexes that are required for vitamin B12-dependent methyl transfer and CO to CO_2 interconversion. I am now using structural and biochemical techniques to characterize enzymes involved in the biosynthesis of biofuel compounds. Here, I aim to gain mechanistic insight into enzyme catalysis not only to better understand the chemistry performed but also to provide the basis for rational protein design. Through structural analysis and the construction of targeted enzyme variants, my objective is to engineer enzymes with more desirable attributes that can be used for the biosynthesis of biofuel compounds. (Read Kung's article; DOI: 10.1021/sb300074k)

YANJUN LIU

Image courtesy of Damien Baigl

Current Position. Postdoctoral Researcher, Department of Chemistry, Ecole Normale Supérieure (ENS), Paris, France. Advisor: Prof. Damien Baigl.

Education. Postdoctoral Fellow in Systems Cell Biology of Cell Polarity and Cell Division, Institut Curie - Ecole Normale Supérieure (ENS) - Ecole Supérieure de Physique et de Chimie Industrielles (ESPCI) (2008−2011); Advisors: Dr. Matthieu Piel, Prof. Damien Baigl, and Dr. Christophe Tribet. Ph.D. in Analytical Chemistry, Wuhan University, Wuhan, China (2008); Advisors: Prof. Dai-Wen Pang and Prof. Yong Chen.

Nonscientific Interests. Traveling, music, badminton, cinema, spending time with family and friends

Received: October 30, 2012
Published: November 16, 2012

   dx.doi.org/10.1021/sb300117q | *ACS Synth. Biol.* 2012, 1, 495−497

My past research focused on developing integrated microfluidic devices and exploring their applications in cell biology. With the help of synthesis, surface chemistry, and microfabrication techniques, I designed and developed photoresponsive functional polymers and innovative microdevices to control the main physical and chemical parameters of cellular environment, for the purpose of understanding both the molecular mechanisms and physical principles governing cell polarity and directing cell migration. I am currently working on controlling *in vitro* expression of functional proteins, including enzymes and membrane proteins, inside artificial cell models. In this work, we placed under photocontrol, the synthesis and activity of an enzyme without any modification. Spatially resolved activation of substrate conversion was achieved by encapsulating both a custom-made photoresponsive reconstituted gene expression medium and enzyme substrate in an array of independent microfluidic chambers that were addressed with a UV light stimulus. (Read Liu's article; DOI: 10.1021/sb300010a)

JIN HWAN PARK

Image courtesy of Jin Hwan Park

Current Position. Research Staff Member, Samsung Advanced Institute of Technology

Education. Research Assistant Professor, KAIST (2007−2011); Ph.D. in Chemical and Biomolecular Engineering, KAIST, Daejeon, Korea (2003−2007); Advisors: Prof. Sang Yup Lee. Research Scientist, LG Chem. (1998−2003). M.S. and B.S. in Genetic Engineering, Korea University, Seoul, Korea (1990−1997).

Nonscientific Interests. Watching soccer and baseball games, reading

My Ph.D. thesis focused on the application of systems biology for the development of an *E. coli* strain to efficiently produce L-valine. My research focuses on the development of microorganisms for the efficient production of chemicals and fuels using highly advanced systems and synthetic biology tools. In the present study, the 100% genetically defined L-isoleucine production strain we report was successfully developed using four systematic engineering strategies. The final L-isoleucine titer of 9.46 g/L obtained in this study is almost comparable to that obtained with the strain constructed by classical random mutagenesis. My ongoing work involves the further development of systems and synthetic biology platforms applicable to develop an industrially compatible strain. (Read Park's article; DOI: 10.1021/sb300071a)

WEERAWAT RUNGUPHAN

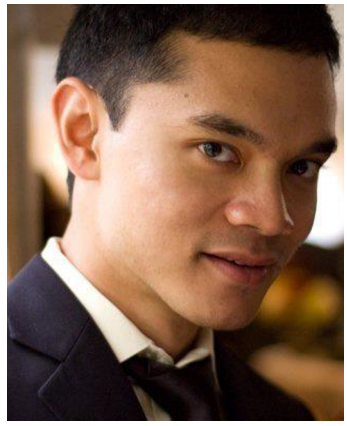

Image courtesy of Weerawat Runguphan

Current Position. Postdoctoral Researcher, Joint BioEnergy Institute, Lawrence Berkeley National Laboratory, Emeryville, CA. Advisor: Prof. Jay D. Keasling.

Education. Ph.D. in Biological Chemistry, Massachusetts Institute of Technology, Cambridge, MA (2011); Advisor: Prof. Sarah E. O'Connor. B.A. in Chemistry and Physics, Harvard University, Cambridge, MA (2006).

Nonscientific interests. Living the San Francisco life (including celebrating the Giants' second World Series championship in three years!)

My Ph.D. work focused on the genetic engineering of alkaloid biosynthesis in the medicinal plant Madagascar periwinkle to generate novel alkaloid analogues that could have improved biological activities. I introduced prokaryotic halogenases into periwinkle hairy root cultures and demonstrated that these enzymes are able to function within the context of the plant cell to generate chlorinated and brominated tryptophan analogues, which are then shuttled into the plant secondary metabolism to yield chlorinated and brominated alkaloids. I am now engineering the budding yeast *Saccharomyces cerevisiae* to produce structurally tailored fatty-acid-derived biofuels and chemicals directly from simple sugars. (Read Runguphan's article; DOI: 10.1021/sb300074k)

ANNA VENANCIO-MARQUES

Image courtesy of Sergii Rudiuk

Current Position. Ph.D. Candidate, Department of Chemistry, Ecole Normale Supérieure, Paris, France. Advisor: Prof. Damien Baigl

Education. M.Sc. in Chemistry and Biochemistry, Ecole Normale Superieure de Lyon, Lyons, France (2011)

Nonscientific Interests. I enjoy cooking and reading. I also love to hike and to travel to new countries.

The work presented in this paper appealed to me as an interesting challenge at the interface of chemistry and biology. I thought that turning on and off the expression of a gene at will, with the help of an easily synthesized, photosensitive molecule, was a very elegant method. Not only is using light as a switch a bright idea but also it gives unparalleled spatiotemporal precision. Furthermore, the commercial system for gene expression that we used relies on a great technical achievement: it is reconstituted from all the necessary, purified components. My goal was to apply the concept of photoinduced gene expression to an enzyme with exciting properties; here, β-lactamase was made to turn a nontoxic, nonactive pro-drug into an active drug, such as Protax, resulting in the anticancerous Taxol. (Read Venancio-Marques' article; DOI: 10.1021/sb300010a)

dx.doi.org/10.1021/sb300117q | *ACS Synth. Biol.* 2012, 1, 495−497