ACS SyntheticBiology
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NATHAN CROOK

Jie Sun

Current Position. Graduate student at the University of Texas, Austin. Advisor: Dr. Hal Alper.

Education. Bachelor's degree from the California Institute of Technology.

Nonscientific Interests. I enjoy photography, gardening, hiking, traveling, live music, and home-brewing mead.

I am generally interested in the development of new tools to expedite strain engineering. In this vein, I had become quickly frustrated by the slow pace of knockout generation in yeast and so started searching for a faster way to perform this technique. I was delighted to learn that RNA interference was functional in this organism and decided that optimizing this approach as a tool would be of general use to myself as well as others when doing yeast metabolic engineering. I think that the techniques described in this paper nicely complement existing genome editing techniques in yeast and should prove very useful at the outset of a project while identifying a suitable host chassis and especially while engineering polyploid strains. (Read Crook's article; DOI: 10.1021/sb4001432).

FANNY DELEGRANGE

Fanny Delegrange

Current Position. Research Associate at Evolva Biotech SA, Reinach, Switzerland.

Education. Master's in Biotechnology, Compiegne, France.

Nonscientific Interests. I enjoy hiking and especially the great feeling when you reach the top of a mountain and admire the landscape. I like exploring new countries and their local cuisine, as at home, I am keen on cooking.

My research work is focused on optimizing biosynthetic pathways to produce valuable products in yeast. To find new biosynthetic routes, I am using combinatorial genetics that create billions of different yeast cells expressing multiple new gene combinations on yeast artificial chromosomes (YAC) and I am screening for the ones producing the desired ingredient. This approach can also generate diverse small molecules for drug discovery. Once established, a biosynthetic route needs to be improved for purity, yield, speed of conversion and final titer to lower the cost of production of the ingredient. To do so, I am optimizing the biosynthetic pathways using a combination of molecular engineering, enzyme cofactor balancing, metabolic engineering and pathway flux analysis. (Read Delegrange's article; DOI: 10.1021/sb400177x)

VOLKER KURZ

Volker Kurz

Current Position. Postdoctoral Scholar, Department of Electrical Engineering, University of Notre Dame. Advisor: Prof. Gregory Timp.

Education. Ph.D. Physics, Heidelberg University, Germany (2011). Advisor: Professor Patrick Koelsch; Master Physics, State University of New York at Buffalo (2007). Advisor: Professor John Cerne; Intermediate diploma in Physics, University of Wuerzburg, Germany (2005).

Nonscientific Interests. I enjoy spending time outside riding my bicycle, hiking in the mountains, or canoeing when the circumstances allow it.

My research is driven by my drive to develop new tools and technologies with single molecule precision, to advance research in life sciences. My current efforts are focused on the development of a method to detect the secretome of a single cell using a nanopore. Previously, I developed a method to transfect a cell with single molecule precision combining the principle of cell electroporation with the single molecule sensitivity of a synthetic nanopore. To verify the results I used photon counting fluorescent confocal

Received: May 2, 2014
Published: May 16, 2014

dx.doi.org/10.1021/sb5002449 | *ACS Synth. Biol.* 2014, 3, 261−263

microscopy. An excellent example of the importance of single molecule precision for making discoveries in biology is my recent article. (Read Kurz's article; DOI: 10.1021/sb400052f).

EDWARD M. NELSON

Edward M. Nelson

Current Position. Postdoctoral Research Assistant, Department of Electrical Engineering, University of Notre Dame. Advisor: Dr. Gregory Timp.

Education. Ph.D. Physics, University of Rochester (2009). Advisor: Dr. Lewis Rothberg. B.A. Physics, Hamilton College (2001).

Nonscientific Interests. Outside of scientific pursuits, I enjoy cooking, listening to music, and spending time with my dog Maggie.

My research interests involve using single-molecule/cell techniques to study biological systems. Here, we used optical tweezers to create a synthetic biofilm of genetically engineered *E. coli* to study genetic variability in a fluctuating environment. The bacteria were modified with a bistable switch that responded to an environmental quorum sensing (QS) molecule at a low threshold concentration. By controlling the exposure of each colony to the QS activator, we studied how bacteria responded to and coordinated with environmental cues. We discovered that cellular response and sensitivity to changes in the environment was retained after cell division as epigenetic memory thus allowing the colonies to anticipate and take advantage of environmental variability. In the future, I plan on using similar single molecule techniques to study genetic dynamics and mechanobiology during development. (Read Nelson's article; DOI: 10.1021/sb400052f).

NICOLAS PERRY

Nicolas Perry

Current Position. Postdoctoral trainee, University of Texas Medical Branch, Division of Infectious Diseases. Advisor: Dr Clinton White.

Education. Postdoctoral fellow at the Notre Dame University, Department of Electrical Engineering. Advisor: Gregory Timp. Ph.D. in Biophysics, University of Michigan. Advisor: Alex Ninfa. M.A. in Physics, Duke University. B.S. in Physics and Computer Science, Universidad de los Andes Bogota, Colombia.

Nonscientific Interests. Traveling, soccer, salsa music.

This paper showed that it is possible to synchronize gene expression in response to an external stimulus, by using synthetic biology which, I think, is a significant development in the field. My interests are in the field of synthetic biology and genetic manipulation/gene editing of both prokaryote and eukaryote cells. Currently, I work in the genetic manipulation of the parasite *Cryptosporidium parvum*, which can lead to identify drug targets and/or vaccines. (Read Perry's article; DOI: 10.1021/sb400052f).

ALEXANDER SCHMITZ

Alexander Schmitz

Current Position. Undergraduate Research Assistant at the University of Texas, Austin. Advisor: Dr. Hal Alper.

Education. Undergraduate in Chemical Engineering at the University of Texas at Austin. Advisor: Dr. Hal Alper.

Nonscientific Interests. I enjoy outdoor activities such as backpacking and mountain biking.

My research focuses on developing novel metabolic engineering tools that have a wide range of industrial and pharmaceutical applications. Microorganisms are ideal for producing "green" chemicals that utilize renewable resources. New tools are required to manipulate these organisms to produce these chemicals at economically viable levels. One tool we are developing utilizes RNA interference. RNA interference allows transcripts of genes to be degraded effectively creating a knockdown phenotype for selected genes. This process is much easier than creating a knockout especially when the functionality of the knockdown is not entirely understood. RNA interference can also be used to create knockdown libraries for the entire genome to find the most effective knockdowns in a given system. (Read Schmitz's article; DOI: 10.1021/sb4001432).

HANNA J. WAGNER

Hanna J. Wagner

Current Position. Ph.D. candidate, Faculty of Biology, University of Freiburg, Germany. Advisor: Prof. Dr. Wilfried Weber.

Education. Diploma in Biology, University of Freiburg, Germany. Advisor: Prof. Dr. Gerald Radziwill.

Nonscientific Interests. In my free time I enjoy sports—especially jogging and table tennis, which I play competitively. I love being creative resulting in drawings, paintings, and photos, which are often used to decorate my living room. Although cooking is not one of my strengths, baking can be fun.

I am fascinated by the many facets, interdisciplinarity and possibilities Synthetic Biology offers. This enabled me to work in different kinds of research fields including the development of AAV-2 (adeno-associated virus-2) vectors with altered tropism or the engineering of bacterial microcompartments. I like the idea of being creative in science, combining different biological parts—regardless from which species—to generate new systems characterized by new specific functions. Being able to act as a molecular biology-engineer also inspired my work on the development of optogenetically controllable protein kinases in mammalian cells. The combination of a plant blue light receptor with human B- and C-RAF isoforms enabled precise regulation of kinase activity and opens new possibilities as a tool for signaling studies. Hence, such engineered systems might connect applied with fundamental research and has great potential in various fields of science—there are no limits to the imagination. (Read Wagner's article; DOI: 10.1021/sb400090s).

SABRINA WEND

Sabrina Wend

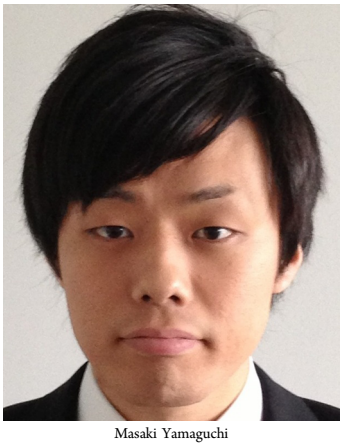
Current Position. Ph.D. candidate, Faculty of Biology, University of Freiburg, Freiburg, Germany. Advisor: Prof. Wilfried Weber.

Education. Diploma (MSc equivalent) in Biology, RWTH Aachen University, Germany.

Nonscientific Interests. Badminton, running, trekking, backpacking, traveling with friends, horrible B-movies, photography, and spreading optimism!

My Ph.D. work generally focuses on the development of novel synthetic tools for the investigation of cell signaling events in different cellular systems. In one of my projects I design cellular biosensors for plant hormones such as auxin or jasmonate toward the quantitative detection of these signaling molecules. My other projects aim at the development of optogenetic tools to control cellular functions with high spatiotemporal resolution by light. In a recent application we engineered a blue light-dependent protein kinase RAF offering a temporally precise, remote control of RAF activity, isolated from upstream signaling cascade effects. The optogenetic kinase RAF can help to investigate the intricate signaling mechanisms of RAF isoforms and downstream targets such as ERK. (Read Wend's article; DOI: 10.1021/sb400090s).

MASAKI YAMAGUCHI



Masaki Yamaguchi

Current Position. Ph.D. Candidate, Department of Chemical Engineering, Faculty of Engineering, Kyushu University, Fukuoka, Japan. Advisor: Prof. Masamichi Kamihira.

Education. B.S. in Chemical Engineering, Kyushu University, Japan. Advisor: Prof. Masamichi Kamihira.

Nonscientific Interests. Traveling, sports, and Japanese chess.

My research is focused on combining synthetic biology with nanotechnology to remotely control gene expression using a magnetic field. Remote activation of target cells to trigger specific gene expression can provide a useful research tool in clinical settings. Magnetite nanoparticles, which generate heat under an alternating magnetic field, have been developed to label cells. In this work, magnetite nanoparticles and heat-induced therapeutic genes were introduced into tumor xenografts. The magnetically triggered gene expression resulted in tumor growth inhibition. This system demonstrates great potential for controlling target gene expression in a space and time selective manner and may be used for remote control of cell functions via gene expression. Currently, I am interested in applying this system to regenerative medicine such as tissue engineering. (Read Yamaguchi's article; DOI: 10.1021/sb4000838).

dx.doi.org/10.1021/sb5002449 | *ACS Synth. Biol.* 2014, 3, 261−263