

abstract

Advances in technology have greatly enhanced our ability to interrogate biology and gain a more in depth understanding of cellular networks. In particular, the ability to rapidly sequence and synthesize DNA have provided a wealth of knowledge and opened up the field of synthetic biology. However, in order to synthesize new genetic parts, we must first catalog the parts currently available in the genome. Systems biology focuses on the interactions between components of biological systems and how they interact to determine the phenotype of the cell; I will describe my past work in the field of systems biology, particularly in the field of metabolic modeling and transcriptomics and how these tools can be used to predict and measure phenotypic changes in the cell. Once the list of parts has been created using systems biology, we can start to edit, revise and write genomes in order to introduce complex traits and produce molecules of interest. A major challenge in this field is how to introduce numerous changes simultaneously over the entire genome; in order to minimize the time required to develop new production strains, I have developed a strain of E. coli which facilitates efficient multiplex recombineering of targets around the genome. This strain has 15 co-selectable markers which can be used for co-selection recombineering to enhance a subpopulation of cells that carry the desired mutation (whether or not the desired mutation has a phenotype), thus enhancing multiplex recombineering efficiency and greatly reducing strain development time.

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biosketch

Nanette Boyle received her BSE in Chemical Engineering from Arizona State University in 2004. She obtained a PhD from Purdue University where she was a National Science Foundation Graduate Research Fellow. During her PhD, she spent 6 months at TU Delft in The Netherlands as a visiting scholar in Sef Heijnen's group. Following graduation in 2009, she joined the Biochemistry Department at UCLA as a postdoctoral scholar in Sabeeha Merchant's group. In 2011, she moved to CU Boulder and joined Ryan Gill's group where she is currently a postdoctoral scholar.