ACS SyntheticBiology

Editorial

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IWBDA 2012 Special Issue

The *International Workshop on Bio-Design Automation* (IWBDA) brings together researchers from the synthetic biology, systems biology, computer science, and design automation communities. The focus is on concepts, methodologies, and software tools to enable the computational and experimental analysis of biological systems and the synthesis of novel biological functions. Still in its early stages, the field of synthetic biology has been driven by experimental expertise; much of its success has been attributable to the skill of the researchers in specific domains of biology. There has been a concerted effort to assemble repositories of standardized components. However, creating and integrating synthetic components remains a non-trivial and often trial-and-error process. The field has now reached a stage where it calls for computer-aided design tools. This workshop offers a forum for cross-disciplinary discussion, with the aim of seeding collaboration between research communities.

This special *ACS Synthetic Biology* issue includes eight papers based on presentations at IWBDA in San Francisco on June fourth and fifth of 2012. The issue spans a wide range of topics in systems and synthetic biology design automation. In computational systems biology, a paper analyzes the robustness of metabolic networks for photosynthetic processing. On the experimental side, a paper introduces an experimental platform for the verification of reverse engineering algorithms in mammalian cells. The next four papers describe advances in the development of *genetic design automation* (GDA) tools. The first GDA paper proposes a rational design methodology for constructing sequences for libraries of protein coding genes. The second GDA paper introduces the SBROME GDA tool, a novel software tool that can be used to construct genetic circuits from modular components. The third GDA paper presents the AutoBioCAD tool which can be used to design complete genetic regulatory circuits. Finally, the fourth GDA paper describes new features in the iBioSim tool for the modeling of dynamic behavior of cellular populations that include genetic regulatory circuits. The next to last paper proposes *DNA strand displacement*, an *in vitro* form of synthetic biology, to perform signal-processing tasks. Finally, the last paper describes a new language, PaR-PaR, which can be used for automating laboratory work using robots to construct synthetic biological circuits. In conclusion, these papers represent an exciting snapshot of the emerging field of biodesign automation.

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Notes

Views expressed in this editorial are those of the authors and not necessarily the views of the ACS.

NOTE ADDED AFTER ISSUE PUBLICATION

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