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DNA Computing and Molecular Programming

18th International Conference, DNA 18
Aarhus, Denmark, August 14-17, 2012
Proceedings

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Preface

This volume contains the papers presented at DNA 18: the 18th International Conference on DNA Computing and Molecular Programming, held August 14–17, 2012 at Aarhus University, Aarhus, Denmark.

Research in DNA computing and molecular programming draws together mathematics, computer science, physics, chemistry, biology, and nanotechnology to address the analysis, design, and synthesis of information-based molecular systems. This annual meeting is the premier forum where scientists of diverse backgrounds come together with the common purpose of advancing the engineering and science of biology and chemistry from the point of view of computer science, physics, and mathematics. Continuing this tradition, under the auspices of the International Society for Nanoscale Science, Computation, and Engineering (ISNSCE), DNA18 focused on the most recent experimental and theoretical results that promise the greatest impact.

The DNA 18 Program Committee received 37 paper submissions, of which 11 were selected for oral presentation and inclusion in the proceedings, and another 11 for oral presentation. Others were selected for poster presentations. Additional poster presentations came from a poster-only submission track.

The conference program included two tutorials—Milan Stojanovic, Columbia University: "Aptamers in Sensing and Molecular Computing"; and Damien Woods, California Institute of Technology: "A Crash Course in the Theory of Computing."

The conference program also included a plenary Turing Lecture by Grzegorz Rozenberg, University of Leiden: "Processes Inspired by Interactions of Chemical Reactions in Living Cells", and invited talks by Drew Berry, Walter and Eliza Hall Institute of Medical Research: "Visualizations of the Molecular Machines That Create Flesh and Blood"; Jeremy Gunawardena, Harvard Medical School: "Protein Computing"; Radhika Nagpal, Harvard University: "The TERMES Project: An Expedition in Large-Scale Self-assembly"; and Peng Yin, Harvard University: "Modular Self-Assembly of Molecular Shapes."

On the day before the conference, dnatec2012, a one-day workshop on structural DNA nanotechnology, was held, with contributions from Ned Seeman, New York University: "Using DNA's Inherent Chemical Information to Control Structure"; Andy Ellington, University of Texas: "DNA Nanotechnology: Too Small and Too Costly"; William Shih, Harvard Medical School: "Self-Assembled DNA-Nanostructure Tools for Molecular Biophysics"; Hao Yan, Arizona State University: "Designer DNA Architectures for Programmable Self-Assembly"; Andrew Turberfield, Oxford University: "Molecular Machinery from DNA"; Itamar Willner, Hebrew University of Jerusalem: "Nanobiotechnology with DNA"; Chengde Mao, Purdue University: "Self-Assembled DNA Nanocages"; Masayuki Endo, Kyoto University: "Direct Observation of Single Enzymatic and

Chemical Reactions in the Designed DNA Nanostructures"; Friedrich Simmel, Technische Universität München: "DNA Devices and Circuits as Components for Cell-Like Microcompartments"; Thom H. LaBean, North Carolina State University: "Building Agency into Molecular Materials"; and Luc Jaeger, University of California Santa Barbara: "Is RNA Self-assembly the Same as DNA Self-assembly?".

The editors would like to thank the members of the Program Committee and the external reviewers for their hard work in reviewing the papers and providing comments to the authors. They also thank the members of the Organizing Committee and the Steering Committee, and particularly the Committee Chairs, Kurt Vesterager Gothelf and Natasha Jonoska, for their support and advice. Generous financial support by the conference sponsors—the Danish National Research Foundation, Aarhus University, and DNA Technology A/S (Risskov, Denmark)—is gratefully acknowledged.

June 2012

Darko Stefanovic
Andrew Turberfield

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DNA 18 was organized by the Danish National Foundation Center for DNA Nanotechnology at Aarhus University in cooperation with the International Society for Nanoscale Science, Computation, and Engineering (ISNSCE).

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