

METHODS IN MOLECULAR BIOLOGY

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DNA Nanotechnology


Methods and Protocols

Second Edition

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Preface

Both in research labs and in the world outside them, we are currently experiencing the mainstreaming of nanotechnology. After a few decades of discoveries and technological development of the new world at the bottom, now nanotechnology is at work in the industry as well as in many types of labs. Through mating with other sciences and technologies, it is helping to solve societal problems and to enable discoveries, often staying hidden under the hood of products and services.

The mainstreaming is evident at all levels, including the goals of governments and funding bodies. Nowadays funds are granted primarily for innovation in the industry and for the solution of grand societal challenges. Nanotech can contribute to both, but it must synergize and sometimes compete with other technologies in order to do so. Nanotechnology cannot work alone; rather it complements and enhances all other tools of science and technology. The growth of nanotechnology is continuing and it does so with the awareness that to spread and have an impact it must be shared. Methods developed in focused labs must be shared with others and with those that will put them to work in the field and make them part of complex procedures and collaborative efforts organized around the current and future needs of our society. A book of methods is one of the enabling tools of this process as it is an often-missing link between the technology developers and the users.

A few years have passed since the first edition of this book of methods on DNA nanotechnology. We have witnessed the further development of DNA nanotechnology to make ever more brilliantly conceived and realized nanostructures and to make them useful. More applications have come in the biosensing field. New uses and applications have arisen for DNA origami and many more researchers use them nowadays. This new edition contains new methods that enrich the library of the first edition to make a richer arsenal of methods for researchers and technologists expanding to DNA nanotechnology.

Several chapters of this new edition focus on these applicative uses of nanostructures, especially toward biosensing. A number of chapters focus on the use of DNA origami for arranging matter in the nanoscale or on their manipulation with the aid of other technologies, such as nanolithography. There are also chapters detailing the procedures for making nucleic acids nanostructures of different kinds, as these can implement the available set of building blocks for nanotechnology. A few chapters focus on methods to simulate complex nanostructures or on gathering insightful thermodynamic information from probing nanostructures.

This book has also been gifted with an introductory chapter written by Ned Seeman. The recognized father of the field of structural DNA nanotechnology traces some of its historical origins and charms us with a reminder that science and technology are still made by humans.

I trust this book will be able to give its little contribution to the uptake of DNA nanotechnology.

Bologna, Italy

Giampaolo Zuccheri

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