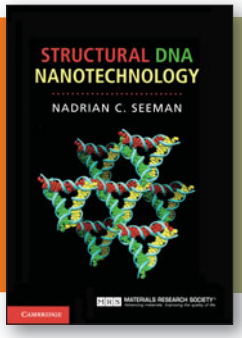


Structural DNA Nanotechnology

Nadrian C. Seeman

Materials Research Society and
Cambridge University Press, 2016
266 pages, $52.00 (e-book $52.00)
ISBN 9780521764483

In the interest of transparency, MRS is a co-publisher of this title. However, this review was requested and reviewed by an independent Book Review Board.

This book provides an authoritative introduction to the nascent field of structural DNA nanotechnology. It was written by the founder of the field, Ned Seeman of New York University. The book was written mostly during a sabbatical that Seeman took in 2010 and was updated in 2014 prior to being published. It reflects the author's multi-decade experience and pioneering contributions to the field of structural DNA nanotechnology. It also summarizes important developments in this field up to 2014. The book provides a comprehensive overview of this field with 14 chapters covering a wide range of topics, from history to motif design, structural characterization, experimental techniques, devices, and computing, as well as the use of DNA as templates for organizing other functional materials.

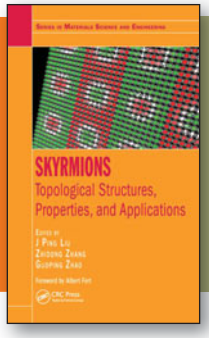
Chapter 1 describes the origins and a brief history of the field of structural DNA nanotechnology, and Chapters 2–7 focus on DNA motifs: various intricate, beautiful, and mostly two-dimensional (2D) DNA structures. Chapter 2 outlines basic principles of DNA nanostructure design, including nucleic acid hybridization, synthesis of desired DNA sequences, and design of branched DNA molecules. Chapter 3 discusses various routes to designing DNA motifs for use as the basis to make objects, lattices, and devices. Chapter 4 describes design examples of DNA motifs using single-stranded DNA, such as knots, Borromean rings, and 2D arrays of DNA junctions. Chapter 5 describes experimental techniques to synthesize and characterize DNA motifs and structures. Chapter 6 is a historical perspective on searching for robust DNA motifs. Chapter 7 is devoted to designing and building larger multi-component constructs by combining different DNA motifs.

Chapters 8–13 address functions of unique DNA structures, including nanomechanics, motions, self-replication, and computing. Chapter 8 discusses DNA structures as nanomechanical devices, where all DNA molecules move in unison at the macroscopic level. Chapter 9 is devoted to the increasingly popular DNA origami and the related DNA bricks. Chapter 10 deals with combining DNA structures with motion, including a discussion of a DNA molecular assembly line. Chapter 11 is dedicated to DNA self-replicating systems. Chapter 12 explores the intriguing possibility of computing with DNA. Chapter 13 summarizes other exotic DNA structures as well as nanostructures made of RNA.

Chapter 14 deals with using DNA as a template to organize other materials and possibly impart functions not possible with other methods. Research on functions and applications of unique DNA structures is at an early stage and has become an increasingly active area of intellectual pursuit and technology development in recent years.

The rapid recent advances in DNA nanotechnology, particularly in building functional 3D structures, devices, and systems with DNA nanotechnology, are a testament of the need for authoritative books like this one. This book features more than 200 full-color illustrations and hundreds of authoritative references, and can serve as a textbook for graduate students. It is well written and easy to follow. It is a must-have book for those who plan to work in the field of DNA nanotechnology. It is also a useful reference book for researchers and graduate students interested in nanoscience, nanotechnology, nanofabrication, nanomedicine, and related fields.

***Reviewer: Qinghuang Lin** of IBM Thomas J. Watson Research Center, USA.*



Skyrmions: Topological Structures, Properties, and Applications

J. Ping Liu, Zhidong Zhang, and Guoping Zhao, Editors

CRC Press, 2016
502 Pages, $175.96 (e-book $153.97)
ISBN 9781498753883

Physicist Tony Skyrme introduced a topological feature called a skyrmion more than 50 years ago. Recently, skyrmions have drawn a great deal of new attention, not only for the related topology and physics, but also for the potential applications of skyrmions in advanced technology (i.e., high-capacity information storage). Research activities on skyrmions have been booming over the past few years, but there have been no books providing a comprehensive review of the research, until this publication. To my knowledge, this is the first book that covers the concepts and features of magnetic skyrmions in such a systematic and comprehensive manner.

The foreword is written by Nobel laureate Albert Fert. The book consists

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