

Chromosome Nanoscience and Technology

Despite the enormous progress made in genetic research, knowledge about the exact structure of the chromosome continues to provide a challenge. Much of that challenge lies with the need for improved tools and methods that researchers require to perform novel analyses beyond the DNA level. Fortunately, rapid advances in nanotechnology, which are exposing the submicroscopic design of nature in every field of scientific endeavor, are now being employed to examine, analyze, and manipulate biological material at the chromosome level.

Chromosome Nanoscience and Technology reviews these advances to look at the newest trends and applications in chromosome research. In addition to offering a guide to current progress and motivating further research, this book serves as the culminating report on a Japanese national nanobiology project in the field of chromosome science begun in 2000.

The multidisciplinary project brought together researchers from various backgrounds covering molecular biology, biochemistry, protein science, immunology, genetics, anatomy, pharmaceutical science, semiconductor production, polymer and electronic chemistry, material science, microscopy, biometry, and informatics, among others.

Looking at chromosomes as nanomaterials, this cutting-edge volume—

- Describes those devices and methods used for handling the smallest biological materials
- Details the visualization of chromosomes at nano- and micro-levels, including the most advanced applications ever employed for scanning probe microscopy
- Discusses the development of a sustainable chromosome imaging database
- Examines techniques for isolation, comparative proteome analyses, and structural/functional analyses
- Reveals a new method for producing antibodies to chromosomal proteins

This project, initiated a few years ago when nanotechnology was still relatively unknown, now lays the groundwork for those scientists looking to perform further research in chromosome science. It provides them with starting points, as well as useful applications and methodology to assist in the long quest to gain a deepened understanding of life itself.



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