



# Polymers and Nanomaterials for Gene Therapy

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*Polymers and Nanomaterials for Gene Therapy* provides the latest information on gene therapy, a topic that has attracted significant attention over the past two decades for the treatment of inherited and acquired genetic diseases. Major research efforts are currently focused on designing suitable carrier vectors that compact and protect oligonucleotides for gene therapy.

The book explores the most recent developments in the field of polymer science and nanotechnology, and how these advancements have helped in the design of advanced materials. Non-viral vector systems, including cationic lipids, polymers, dendrimers, peptides and nanoparticles, are potential routes for compacting DNA for systemic delivery. However, unlike viral analogues that have no difficulty in overcoming cellular barriers and immune defense mechanisms, non-viral gene carriers consistently exhibit significant reduced transfection efficiency due to numerous extra- and intracellular obstacles. Therefore, biocompatibility and potential for large-scale production make these compounds increasingly attractive for gene therapy.

This book contains chapters on the engineering of polymers and nanomaterials for gene therapy, and how they can form complexes with DNA and avoid both in vitro and in vivo barriers. Other chapters describe in vitro, ex vivo, in vivo gene therapy studies, and the current issues affecting non-viral gene therapy.

- Explores current challenges in the research of genetic diseases
- Discusses polymers for gene therapy and their function in designing advanced materials
- Provides examples of organic and inorganic nanomaterials for gene therapy
- Includes labeling, targeting, and assays
- Looks at characterization, physico-(bio)chemical properties, and applications

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