
Preface

Increasingly, researchers find themselves involved in discipline-spanning science that a decade ago was simply inconceivable. Nowhere is this more apparent than at the cusp of two rapidly developing fields, nanoscience and biotechnology. The resulting hybrid of nanobiotechnology holds the promise of providing revolutionary insight into aspects of biology ranging from fundamental questions of receptor function to drug discovery and personal medicine. As with many fields fraught with increasing hyperbole, it is essential that the underlying approaches be based on solid, reproducible methods. It is the goal of *NanoBiotechnology Protocols* to provide novice and experienced researchers alike a cross-section of the methods employed in significant frontier areas of nanobiotechnology.

In a rapidly developing field such as biotechnology, it is difficult to predict at what mature endpoint a field will arrive. Today, nanobiotechnology is making significant advances in three broad areas: novel materials synthesis, dynamic cellular imaging, and biological assays. As a testament to the true nature of interdisciplinary research involved in nanobiotechnology, each of these areas is being driven by rapid advances in the others: New materials are enabling the imaging of cellular processes for longer durations, leading to high-throughput cellular-based screens for drug discovery, drug delivery, and diagnostic applications.

NanoBiotechnology Protocols addresses methods in each of these areas. Two overview chapters are provided for perspective for those beginning investigations in nanobiotechnology. Throughout this volume, there is a deliberate emphasis on the use of nanoparticles. As functionalized materials, they represent one of the fundamental enabling nanoscale components for these technologies. Consequently, many of the protocols highlight diverse strategies to synthesize and functionalize these probes for biological applications. Other chapters focus on the use of biological components (peptides, antibodies, and DNA) to synthesize and organize nanoparticles to be used as building blocks in larger assemblies. The methods described herein are by no means complete;

nor are they necessarily intended to be. Every day seems to produce new applications of nanotechnology to biological systems. It is our hope that this volume provides a detailed, hands-on perspective of nanobiotechnology to encourage scientists working in interdisciplinary fields to recognize the utility of this emerging technology.

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