METHODS IN MOLECULAR BIOLOGY™

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NanoBiotechnology Protocols

Second Edition

Edited by

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Humana Press

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Preface

Nanobiotechnology holds the promise of providing revolutionary insight into aspects of biology ranging from fundamental questions such as elucidating molecular mechanisms of brain disorders to extraordinary applications such as the detection of a single cancer cell in a population of a million cells. Since the publication of the first volume of *Nanobiotechnology Protocols* 6 years ago, this relatively new field at the intersection of nanoscience and biotechnology has advanced from childhood to adolescence. It is already clear, though, that nanobiotechnologies have found a permanent place in the laboratory. To that end, it is essential that the underlying approaches be based on solid, reproducible methods. It is the goal of *NanoBiotechnology Protocols II* to provide novice and experienced researchers alike a cross section of the methods employed in two foundational areas of nanobiotechnology: imaging and detection. *NBP II* also explores new nano-bio constructs and examines the toxicology of nanomaterials.

Nowhere has nanobiotechnology made a more significant impact than in the area of biological imaging and detection. Chapters 1–9 address different nanoprobe and methods for imaging or detection. The substances that make up these probes range from semiconductors to noble metals to carbon and can offer signals several-fold brighter and substantially more stable than traditional organic probes. Additionally, these imaging approaches can be translated to diagnostic approaches for the detection of important pathogens or disease states. Nanobiotechnology is also embracing the interface between hard inorganic materials and the soft functional biology through important designs using amino acids, peptides, and nucleotides (Chapters 10–13). These building blocks afford the research a variety of approaches that not only can be tuned to control the shape, habit, and properties of a nanoparticle but also allow the self assembly of these particles into larger, functional constructs. Finally, in any emerging technology, there are important safety concerns about the materials. This is especially true in an emerging field such as nanobiotechnology, where truly new materials will be interacting in a biological context. For that reason, establishing the toxicology of these materials is an important “next step” in their development and two protocols for toxicity studies are presented in Chapters 14 and 15. Together, these chapters highlight important current areas of development and directions of the field for the future.

Nashville, TN, USA

*Sandra J. Rosenthal
David W. Wright*

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