Preface

The 21st century is witnessing rapid progress in the areas of life science and biotechnology. It is therefore increasingly important to detect and quantify biologically essential molecules not only in scientific research but also in medicine, the food processing industry, the environment, security, and our daily lives.

Biosensors are analytical devices composed of a recognition element of biological origin and a physicochemical transducer, which makes the study of biosensors an interdisciplinary endeavor. The development of novel principles and devices requires highly collaborative interactions between chemists, electronic engineers, life scientists, and experts in nanotechnology as well as those in the fields of biomaterials, bioinformatics, and the physical sciences. An excellent example is nanobiosensing (molecular biosensing based on nanomaterials), where detection limits are becoming increasingly lower, reaching zeptomolar concentrations in some cases. Nanobiosensing also opens up possibilities for ultrasensitive, multiplexed detection.

Research topics of particular interest in biosensing include fundamental work on highly sensitive and discriminative biosensing. Projects might include the following: new approaches to integrated sensor systems, probe development, and actuators; novel, robust, easy to operate sensor systems with highly selective responses to multiple analytes under variable conditions, with increased sensitivity and significantly fewer false-positive and false-negative responses; innovative ideas in the development of novel biorecognition strategies; development of multifunctional nanomaterials with predefined physical, chemical, or biological characteristics for biosensing applications.

It is clear that the successful development and application of biosensing technology were the results of the fundamental understanding and study of confinement and orientation of biomacromolecules (e.g., proteins, peptides, DNA) at micro and nano interfaces. Besides, new biorecognition strategies based on artificial recognition elements and synthetic materials also play important roles in this field. Molecular sensors are now capable of monitoring biological structure interactions (e.g., protein-protein interactions,

cell-to-cell talk, interkingdom signaling). Other approaches (e.g., methods for triggering dissociation of analytes from probes) allow us to recognize targets selectively and reversibly, thereby enabling continuous monitoring of life processes. These advances provide powerful tools for life sciences.

This special issue covers various aspects of biomolecular sensing using a variety of nanomaterials including carbon nanotubes, nanowires, fullerenes, dendrimers, and metallic and quantum dot nanoparticles. The studies described deal with the use of nanomaterials not only for enhancing the capability of conventional biosensing platforms but also for leading to new approaches, such as biomimetic and reagentless biosensing.

Scientists in China have developed many innovative methods and techniques for biosensing, as shown herein. Despite the limited publication space, this special issue reflects the great and brilliant progress that has occurred in the biosensing field. Certainly, it is with regret that the issue could not cover all of the recent successes in this area in China.

We are grateful to all the authors who have shared our enthusiasm and vision by contributing high quality manuscripts, keeping in tune with the theme of this issue. We deeply hope that Chinese analytical scientists will continue to contribute their excellent research studies for publication in *Science China Chemistry*.

We offer our sincere thanks to all of the authors for their important contributions. We also thank the editors, Dr. SONG GuanQun and Dr. ZHU XiaoWen *et al.*, for their enthusiasm and the excellent organization that made this issue possible.

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