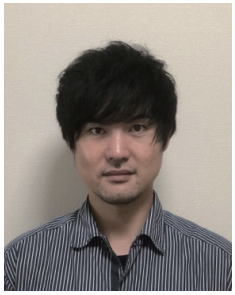
Special Issue on Biosensing Technology Using Micro- and Nanostructures

Preface



Micro- and nanostructures have contributed significantly to the progress of biosensors. Micro- and nanomaterials, such as particles and thin films, have unique characteristics, such as electrical conductivity, optical properties, and magnetic properties, brought about by material and size effects. The use of such materials for sensing has led to the development of sensing technologies based on novel principles and marked improvements of sensor performance characteristics (e.g., detection sensitivity and response speed), thereby expanding the range of analytes that can be studied and application fields. On the other hand, the micro- and nanofabrication techniques developed from micro-electromechanical system (MEMS) technology have contributed to the development of micromachines and the field of micro- and nanofluidics. BioMEMS technology, in which micromachines are applied to biosensors, has realized localized sensing in areas including the vicinity of a single cell and high-throughput cell manipulation. In addition, the combination of microfluidic devices (e.g., μTAS, lab-on-a-chip, and organs-on-a-chip) and biosensors has made it possible to develop analytical devices that integrate analytical operations, such as sample pretreatment and reactions with biosensing, enabling the downsizing of analytical devices and the automation of operations. More recently, the remarkable progress in 3D printing and micro-machining has made it easier to form 3D microstructures. These technologies make it possible to create microstructures that cannot be realized using photolithography techniques, such as hollow and gradient structures. Because of this, it is expected that new biosensing technologies using 3D microstructures will be developed in the future. The development of micro- and nanostructured sensing technology that utilizes interesting phenomena and advanced manufacturing technology will greatly accelerate the future biosensor field.

In this special issue, we have published five papers that are classified into two categories: micro- and nanomaterials that can be used for biosensing, and analytical methods that utilize micro- and nanospaces. In these papers, we describe new materials and analytical principles, and the findings they present will make a significant contribution to the development of the

biosensor field. We would like to thank all the authors, reviewers, and other people who have helped in the editorial process. Special thanks go to the editorial members of MYU K.K. for inviting us to be editors of this special issue.

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