Special Issue on Nano/Biotechnology

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During last few decades, nanobiotechnology has been dramatically advanced by combining greatly enhanced technologies with theoretical understanding the physical and chemical properties of molecules at nanoscales. The direct manipulation and observation of target molecules allow us to get innovative approaches in various fields including biology, engineering, and medicine. Owing to its importance, we would like to introduce current research trends of nanobiotechnologies in this Special Issue of Biomedical Engineering Letters. This special issue includes four highly qualified review papers covering various state-of-art nanobiotechnologies and their applications.

The first paper entitled “Graphene Bioelectronics” by Choi et al., introduce bioelectronics with graphene which is a highly interested nanomaterial. Due to its mechanical flexibility and biocompatibility, graphene can be used as an interface for implantable bioelectronics. Moreover, its superior carrier mobility and transconductance has potential

applications as field effective signal transducers to identify charge perturbation from chemical/biological event. Thus, this paper reviews recent developments in graphene based bioelectronics, focused on materials synthesis/fabrication, cellular interfaces, and three dimensional (3D) bioelectronics.

The second paper “Current Nano/biotechnological Approaches in Amyotrophic Lateral Sclerosis” is described by Choi and colleagues. As amyotrophic lateral sclerosis (ALS) is a common late-onset neurodegenerative disorder, there has been no conclusive etiology. However, this paper provides an overview of hypothesized mechanisms and possible biomarkers for ALS pathology. In addition, it also covers recent nano/biotechnological approach in studying disease mechanism and developing diagno-therapeutic methods for ALS.

The third paper entitled “Development Models of Functional Maps in Cortex” by Paik introduces functional maps in the primary visual cortex (V1) in higher mammals. Functional maps in the brain are considered as key features that reveal the working mechanism of neural circuits. In spite of the critical importance, it has not been clearly answered how this map structure is created during early development for the past decades. This paper provides the latest model view on this issue to discuss the developmental mechanism of the orientation preference maps and how the development of the functional structure in the nervous system can be understood in mathematical model.

The last paper “Helical Structures of Unnatural Peptides

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for Biological Applications” by Choi introduces reviews representative examples of the mimicry of natural peptide helices with unnatural ones. Since many important biological functions involve the recognition of helical domains of natural protein, numerous methods have been developed to mimic natural helices in proteins for biological application including inhibitors of protein-protein interactions and antimicrobial activities. This paper covers how unnatural peptides are constructed with incorporation of artificial

building blocks other than α -amino acid residues and could adopt stable helical conformations.

We would like to express our deepest gratitude to the authors who provide highly qualified overviews for nanobiotechnologies and their applications. We also appreciate the managing editor (Prof. Jae Sung Lee) and Editor-in-Chief (Prof. Sang-Hoon Lee) of the Biomedical Engineering Letters for their help, support, and contribution of this Special Issue.