Nanoscale Protein Chip based on Electrical Detection

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Abstract

Photoinduced electron transport process in nature such as photoelectric conversion and long-range electron transfer in photosynthetic organisms are known to occur not only very efficiently but also unidirectionally through the functional groups of biomolecules. The basic principles in the development of new functional devices can be inspired from the biological systems such as molecular recognition, electron transfer chain, or photosynthetic reaction center. By mimicking the organization of the functional molecules in the biological system, molecular electronic devices can be realized artificially[1].

The nano-fabrication technology of biomolecules was applied to the development of nano-protein chip for simultaneously analyzing many kinds of proteins as a rapid tool for proteome research. The results showed that the self-assembled protein layer had an influence on the sensitivity of the fabricated bio-surface to the target molecules, which would give us a way to fabricate the nano-protein chip with high sensitivity. The results implicate that the biosurface fabrication using self-assembled protein molecules could be successfully applied to the construction of nanoscale bio-photodiode and nano-protein chip based on electrical detection.

Acknowledgment

This work was supported in part by the Korea Science and Engineering Foundation (KOSEF) through the Advanced Environment Monitoring Research Center at Kwangju Institute of Science and Technology.

Reference

1. J.-W. Choi and M. Fujihira, Molecular-scale biophotodiode consisting of a green fluorescent protein/cytochrome c self-assembled heterolayer (2004), Appl. Phys. Lett., 84, 2187.