

Wireless Nanomechanics-based Biosensors for Biochemical Detection

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Abstract

Recent intriguing biosensing applications have been performed in process using microcantilevers modified with self-assembled monolayers (SAMs) or an immobilized receptor and its target. It spontaneously forms from solution or vapour phase on the Au(111) surface providing an ideal platform for sensing medical devices. This work presents the specific recognition of organic molecules, cardiac vascular disease (diagnosis biomarkers) and cobia bacteria on the microcantilevers which can translate the interaction into nano- mechanical motion as well as to improve sensing efficiency and sensitivity, respectively that is particularly promising in the field of biosensors. In addition, a fully integrated biomolecular detection system was further developed, which consists of PC board-based temperature-monitored and an electrical readout system connected with a micro- cantilever-based sensor, and microchannel by secure digital (SD) interface for electrical signal delivery and disposable convenience. Owing to high compatibility of the microcantilever and standard-CMOS wireless device in terms of process and materials, the System-On-Chip (SOC)-based biosensor is highly expected and potentially miniaturized to a grain size for a further step of a personal tele-medicine/ telecare for post-hospital patient-centric care management.

Bibliography

Long-Sun Huang received his B.S. in Aeronautical and Astronautical Engineering Department from National Cheng-Kung University, Taiwan, in 1989, and M.S. in Power Mechanical Engineering Department from National Tsing-Hua University, Taiwan, in 1993. He was a recipient of the three-year Taiwan government Award and then pursued his Ph.D. degree between 1995-1999 in the Department of Mechanical Engineering, University of California, Los Angeles (UCLA). He joined the Institute of Applied Mechanics, National Taiwan University in 1999, and co-established the Taiwan National Science Council Northern Region MEMS center.

He is currently an Associate Professor, and serving as a manager in business & operation of the Regional NEMS/MEMS center in Taiwan where it provides a NEMS/MEMS common lab environment for research, teaching, hands-on training, and services. His research interests are Bio-nanotechnology, Optical MEMS, Biosensor, Telemedicine/Wireless Sensor Network.