

BioCMOS technology and its application to portable biosensor instruments

Kazuo Nakazato

(Nagoya University, Graduate School of Engineering, Professor)

【Outline of survey】

Semiconductor integrated circuits are the base of present information and communications technologies, and have been developed exponentially in this half century, and are expected to be continuously developed in future. During such development the merit of integrated circuits, such as miniaturization, low power consumption, and system on a chip, could be utilized for not only information and communications but also medical, health, and environmental applications. The purpose of this research is to establish BioCMOS technology, combining semiconductor integrated circuits technology with biotechnology, and to pave the way for the application of semiconductor integrated circuits to medical and health fields. To realize BioCMOS chips detecting specific DNA sequences, proteins, and cells, (1) interdisciplinary research on macromolecules-fluid semiconductor system, (2) sensor interface circuits, (3) sensor system on a chip, and (4) assembling technology will be developed. During the research, biosensor chips will be fabricated, tested, and assembled. Laboratory prototype will be constructed to prospect the medical and health applications.

【Expected results】

Moving into aging and mature society, interest in health and medical care is increasing. In 2010, ten thousand and seven hundred billion yen market is expected in Japan for demand of solving anxiety to health (realization of new medical system by innovation, Industrial Structure Advisory Council, Japan, December, 2001). BioCMOS chip could realize portable biosensor instruments, which everybody can operate anytime for health care based on individual constitution and early detection of infections and cancers, so medical care in home or at the place staying and food inspection at shopping floor may become possible.

【References by the principal investigator】

- K. Nakazato, M. Ohura, and S. Uno, "CMOS cascode source-drain follower for monolithically integrated biosensor array," IEICE Trans. Electron., E91-C, No. 9, (Sep. 2008) (in press)
- K. Nakazato, M. Ohura, and S. Uno, "Source-drain follower for monolithically integrated sensor array," Electronics Letters, 43, No.23, pp. 1255-1257, (Nov. 2007)

【Term of project】 FY2008—2012

【Budget allocation】

75,700,000 yen (direct cost)

【Homepage address】

<http://www.nuee.nagoya-u.ac.jp/labs/nakazatolab/>
<http://biocmos.com/>