



## Foreword

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Bioelectromagnetism is in some sense an origin of biomedical engineering. While it has a long history, it remains to be one of the most important, active, and promising field of research. There are many reasons that keep bioelectromagnetism attractive to researchers. For example, the main targets of research for bioelectromagnetism are heart and brain - two most important organs of human being. It is known that bioelectromagnetic measurement is non-invasive and therefore is most preferable to applications in medicine and healthcare. Since bioelectromagnetic phenomena are not visible, technologies based on bioelectromagnetism such as ECG and EEG are never be replaced by other technology such as imaging.

Some people may have misunderstanding to bioelectromagnetism. In their concept, bioelectromagnetism is only a kind of field of theoretical study on bioelectromagnetic phenomena. It is not true! In fact, bioelectromagnetism, as a research discipline, should include a wide range of fields. In addition to basic studies on bioelectromagnetic phenomena, it includes at least: measurement of bioelectromagnetic signals, bioelectromagnetic signal processing, visualization, instrumentation, and clinical applications. So the bioelectromagnetism is actually synthetic and interdisciplinary.

Papers in this issue are collected from the International Workshop for Bioelectromagnetism (IWBEM 2004) held on October 30 to November 2nd at the University of Aizu, Fukushima, Japan, with a key word: Bioelectromagnetism - from modeling to healthcare. Most of the contributors are famous, world leading scientist in the field, and therefore this issue reflects latest advances in researches in bioelectromagnetism. We can find new progress in basic studies in bioelectromagnetism (Malmivuo) and in molecular and cell modeling (Yamaki et al., Pichl, et al.), most advanced techniques in signal processing applied to ECG and EEG (Cichocki et al., Tsutsumi et al., Ding et al.), modeling and imaging applied to brain and heart (Kozmann et al, Hori et al., Lux et al., Okamoto et al., Kumar et al.), the most advances in brain-computer interface (BCI). It should be highlighted that this issue contains contributions from not only scientists and engineers, but also medical professionals (Tsutsumi et al., Yamaki et al.), who link bioelectromagnetism directly to clinical applications. .

As an invited editor of this issue, I would like to thank all contributors to this issue, as well as all participants to IWBEM 2004. Of course, my thanks also go to Prof. Jaakko Malmivuo, editor-in-chief of IJBEM for his hard working in organizing this issue. I am very confident with the high quality of articles in this issue and hope it useful to our readers.

