



## Foreword

This special issue on biomedical engineering is dedicated to the 20 years anniversary of the Department of Biomedical Engineering, Technomedicum, Tallinn University of Technology, and Estonian Society of Biomedical Engineering and Medical Physics.

As a milestone for this event, the special issue covers a wide range of topics starting with a historical review of the main topics of research in the Department of Biomedical Engineering (Hinrikus), and the reminiscences about the cooperation within biomedical engineering between Finland and Baltic States (Malmivuo).

The most extensively presented research is related to various optical technologies. Firstly, a concept device for *in-vivo* skin assessment by multimodal imaging (Spigulis et al.) proposing a more versatile diagnostic tool in dermatology, is discussed. Analysis of the photoplethysmographic signal for the discrimination of subjects with increased arterial ageing (Pilt et al.) describes a method for diagnosing cardiovascular diseases in the early stage to relieve the burden of this disease in the modern world. An intriguing topic, whether the combined approach of small molecule uremic markers with a possibility for an optical on-line monitoring of end-stage renal disease patients' renal replacement therapy could improve patients' survival (Holmar et al.) is investigated.

In the context of common usage of technology applying electromagnetic radiation in the everyday life, the study for detecting microwave radiation effect on electroencephalographic signal by spectral asymmetry index and Higuchi's fractal dimension (Bachmann et al.)

is relevant. The field of medical physics is represented by a study, evaluating MRI scanners in Estonian hospitals using quality assurance tests (Kaljuste et al.). An overview of a lung function test, interrupter technique, for assessing respiratory resistance, being suitable for small children or for patients with limited co-operation, is presented (Kivastik et al.). A paper, describing how fall detection systems might offer a tool for improving safety among older people (Jämsa et al.), addresses an important issue in our ageing society. The future developments towards medical applications are topic of a paper describing how a weak electron emission current method can characterize nanomaterials, gas and radiation sensing (Dekhtyar).

The variety of themes illustrates interdisciplinary nature of the field biomedical engineering and medical physics, and the complexity the technology meets when applied for better human health.

During the 20 years history many things are changed, the society is focusing on the topics like healthy ageing, personalized healthcare and e-health. However, the main aim of the research in the field of biomedical engineering and medical physics has remained the same – persistently and skilfully to develop, exploit and maintain technology hand in hand with other disciplines for the benefit of the mankind via healthy human beings. This special issue is one small contribution towards this goal.

As a guest editor I am thankful to all the authors, reviewers and editors for excellent cooperation.

Ivo Fridolin  
Guest editor