

Title: Luciferase-Based Microfluidic Platform for Point of Care Testing and Nanomedicine Applications

*Dr. Peter I Belobrov**, Anton S Yakimov, Ivan A Denisov, Kirill A Lukyanenko, Elena N Esimbekova, and Anatoly A Evstrapov

Professor

Siberian Federal University

Russia

Abstract

The problems of modern nanomedicine as the application of nanotechnology are related with problems of microfluidics, because the development of point-of-care testing (POCT) devices for nanomedicine requires various types of disposable microfluidic chips. To address this issue we designed luciferase-based microfluidic platform for bioassaying of physiological fluids. The platform is based on PMMA chips containing enzymes: NAD(P)H:FMN-oxidoreductase and luciferase with substrates of bacterial bioluminescent system immobilized in dried starch droplets (Enzymolum™). After addition of a sample the reagents are releasing from microgel phase and mixing to achieve of bioluminescent signal. The signal measurement can be carried out either PMP or MPPC/SiPM, depending on type of POCT device. The parameters for sufficient mixing and reagents displacement were studied. Suggested chips do not require laboratory expertise from potential user. The prospects for POCT devices on the suggested platform particularly for multiplex biological and massive parallel measurements together with nanodiamond-based amplification biobarcode assay will be discussed. The research was supported by the grant of the Russian Science Foundation (no.15-19-10041).

Biography

Dr. Peter I Belobrov (Ph.D. and Dr. habilitate – biophysics) is a Professor of Biophysics at Siberian Federal University and Institute of Biophysics SB RAS. In 1990 he led the molecular architecture group (MOLPIT now). Together with A M Staver he founded the Russian program “Diamond Nanotechnology” (1992-1994.). He was editor of the NANO-II proceeding (1993). Belobrov has fundamental results: a) in the theory of the ground state of dipole systems (1983), b) the first theoretical model BZT (1976), c) the method of equivalent dynamic system (1985). He proposed a physical mechanism of bioluminescence (1991), nanodiamond surface states (2001) and diamond compass (2015). He has priority results: the structure of the bacterial luciferase Langmuir-Blodgett films (1988), field emission (1998) and paramagnetic properties of nanodiamond (2001), the semiconductor from nanodiamond-pyroc carbon composite (2001). There are of a lot cited papers and a few inventions (see [Google profile](#)). His interest is nanodiamond, quantitative biophysics and microfluidic.