Asian Journal of Pharmaceutical Technology and Innovation

Abstract

Micromagnetic manipulators - ferromagnetic microwire systems for diffusion and separation of dia- and paramagnetic particles in gradient magnetic field

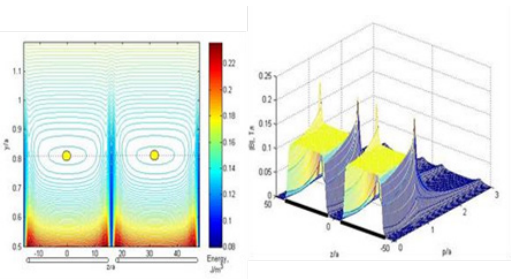
A.V. Beklemisheva

Immanuel Kant Baltic Federal University, Russia

Abstract:

The Gradient magnetic fields using is one of the attractive methods for remote control of transport and diffusion of dia- and para-magnetic particles of micro and nano dimensions. One of the main challenges in the development of new systems for single cell studies is to perform precise cell positioning, but the ability to specifically target cells is also important in many applications. This is of considerable interest for applications in miniature biochemical laboratories and medical physics. In this work, we report the development of new systems to selectively trap single cells upon large arrays, based on the use of micro-magnets, consisting of amorphous micro-wires of Co-rich composition in a glass biocompatible shell to create magnetic fields with gradients in the range of

- . Depending on the wire magnetization and their spatial arrangements, a number of magnetic energy profiles are realized, which are characterized by 2D minima located in the vicinity of wires. A camel-like energy minimum forms in the central plane between two microwires magnetized along a diameter (x-axis). In this case, a stable diamagnetic trap is possible at the height of about the wire radius as demonstrated in Fig. 1a. The microwires can be used with different magnetisation, along the length or diametral, for generate magnetic fields with strong spatial distribution. Thus, for example, the magnetic energy of two wires, with magnetisation along the length, located along their axis (z-axis) has a minimum in the central plane along the radius as shown in Fig. 1b. The designed



magnetic field sources are interesting for cell sorting and manipulation. A minimally invasive non-contact magnetic trapping method is proposed for controlling cell movement and targeted drug delivery, which may be used in cell therapy.

Biography:

A.V. Beklemisheva graduate National Research Nuclear University MEPhI (Moscow Engineering Physics Institute) in 2017. Now she is PhD student in National University of Science and Technology “MISIS”. In National University of Science and Technology “MISIS” she also work as assistant professor since 2017. Also she work junior researcher in The Institute for Design Problems in Microelectronice since 2017, and researcher ehgineer in Kurchatov Institute since 2017. Until 2017, she worked researcher ehgineer in Joint-stock company “Specialized research Institute of instrument engineering «SNIIP»” and trainee ehgineer in Rosenergoatom Concern. Also graduate Moscow Institute of psychoanalysis in 2020. She has published 5 papers in reputed journals. The scientific work is being developed jointly with the scientific supervisor Professor Larisa V. Panina and a student Gurevich Anastasia.

3rd Webinar on Nanotechnology and Nanomedicine, October 08, 2020, London, UK

Citation: A.V. Beklemisheva; Micromagnetic manipulators - ferromagnetic microwire systems for diffusion and separation of dia - and paramagnetic particles in gradient magnetic field, Russia; Nanomedicine 2020; October 08, 2020; London, UK.