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Title:

3D artificial cell membrane structure arrays fabricated on Si substrate in a microfluidic channel

Abstract:

In nature, 3-dimensional (3D) lipid bilayer structures as an array form are frequently observed. Examples can be found in human organs that chemoreceptors to sense various smells or tastes are widely distributed around 3D lipid structures like cilia in olfactory organ or microvilli in a tongue for maximizing the efficiency of a sensing capability, which is closely related to the increase of the number of binding receptors with the increase of surface area as well as an increased probability to meet and bind target molecules as compared with 2D structures. For the last several decades, however, due to the stability limitations of synthetic lipid membranes, the focus has been on the formation of the 2D lipid layer supported on solid substrates in the form of (1) lipid bilayers or monolayers directly deposited on the substrate; (2) tethered bilayer membranes on solid surfaces; and (3) suspended lipid bilayers over micro or nanoapertures. In this talk, the fabrication of artificial 3D lipid structure arrays to mimic sensory organs by using silicon or polymer microwells array in the microfluidic channel will be presented. An improved stability of 3D lipid membrane structure and sealing characteristics as well as pore formation of pore-forming protein in membranes will be discussed for the application to artificial sensory systems or high throughput screening platforms.

Biography:

Tae Song Kim, Ph.D

Principal researcher

Brain science creative research center, BSI

Korea Institute of Science and Technology (KIST)

Professional & Academic Activities

1994-2000 Senior Research Scientist, KIST

1997-1998 Post-doctoral associate, Dept of Electrical Eng and Computer Sci, Univ. of Minnesota, USA

2000- Principal Research Scientist, KIST

2000-2004 Head of Microsystem Research Center, KIST

2004-2010 Director, Intelligent Microsystem Center, 21st Century Frontier Program, Ministry of CIE, Korea

2004- Professor, University of Science and Technology (UST), Korea

2005 Plenary Talk in Transducers 2005, COEX, Seoul

2007 Plenary Talk in MicroTAS 2007, Paris

2007-2010 Director, Korean MEMS Technology Association

2009 Chairman, MicroTAS 2009 at Jeju, Korea

2010- Board Member of Chemical and Biological Microsystem Society

2011-2013 President, Steering Committee of International Symposium of Microchemistry and Microsystem (ISMM)

2011 President, Korean BioChip Society

2012 President, Micro and Nano System Society, Korea

2013-2016 Director, Open Research Program, KIST

2015-2019 Chief Delegate of Korea, World Micromachine Summit

2015-2020 Micro and Nano Fab Center, Director