BRIGHAM AND WOMEN'S HOSPITAL

HARVARD MEDICAL SCHOOL

DIVISION OF BIOMEDICAL ENGINERING

Microfluidic technologies toward the construction of nonequilibrium artificial cells and molecular robots

November 4, 2013

10.30 am, 65 Landsdowne Street, PRB room: 103A

Masahiro Takinoue, PhD

Interdisciplinary Graduate School of Science and Engineering,
Tokyo Institute of Technology, 226-8502, Japan

PRESTO, JST
takinoue@dis.titech.ac.jp
http://www.lifephys.dis.titech.ac.jp/

Abstract

Understanding the essence of life systems is one of the most important issues in science. Although our understanding of the molecular basis of life systems has dramatically increased, the whole picture of life systems as autonomous integrated molecular systems has not been revealed yet. Recently, artificial cell systems as simplified models of natural living cells have been proposed. Using the artificial cell systems, we can explore life systems as autonomous integrated molecular systems [1]. However, most of proposed artificial cell systems have limitations caused by the difficulty in controlling nonequilibrium conditions in cell-sized systems. It is required to develop experimental methods to control nonequilibrium conditions in cell-sized systems by realizing sustained matter and energy flows into/out of cell-sized systems. Here, we report some microfluidic technologies for the construction of artificial cells and molecular robots as micrometer-scaled nonequilibrium dynamic systems [2, 3]. We believe that these challenges will promote the construction of dynamic artificial cells and autonomous molecular robots in the future.

Dr. Masahiro Takinoue received his PhD in Physics from The University of Tokyo in 2007. He then did a post-doc with Prof. Akira Suyama at The University of Tokyo (2007-2008) and with Prof. Kenichi Yoshikawa at Kyoto University (2008-2009), before joining The University of Tokyo as an Assistant Professor (Shoji Takeuchi Lab, 2009-2010). He is a faculty member of Tokyo Institute of Technology from 2011 as an Asoociate Professor. He has also been selected as PRESTO Researcher (2011-) by Japan Science and Technology Agency (JST). He received award "Symbols of Tomorrow" for innovative research in life science in 2013 and "Young researcher award for challenging research" in Tokyo Institute of Technology in 2013.

1. M. Takinoue et al., *Anal. Bioanal. Chem.* 400, 1705-1716 (2011).
2. M. Takinoue et al., *Small* 6, 2374-2377 (2010).
3. K. Maeda et al., *Adv. Mater.* 24, 1340-146 (2012).