

Seminars in Biotechnology BTEC 592 & BTEC 692

“Microfluidic Systems for Biotechnology”

Thursday, May 26, 2022

13:30

GTU Congress Center, Red Hall

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Dr. Barbaros Çetin received his B.S. (2002) and M.S. (2005) in Mechanical Engineering at Middle East Technical University, Ankara, Turkey. He received his PhD (2009) in the Department of Mechanical Engineering at Vanderbilt University where he focused on electrokinetic transport and particle manipulation in lab-on-a-chip devices for biomedical applications. Following his PhD, he became a faculty member in Middle East Technical University-Northern Cyprus Campus Mechanical Engineering Program. In 2011, he became a faculty member in the Mechanical Engineering Department at I.D. Bilkent University, Ankara, Turkey. His current research interests include particle manipulation for microfluidic application, modeling of particle motion using boundary element method, mechanical based fabrication of microfluidic devices, and modeling, fabrication and experimentation of flat-grooved heat pipes. Dr. Çetin is the recipient of the 2015 Bilkent University Distinguished Teacher Award, 2017 Outstanding Young Scientist Award of the Turkish Academy of Sciences (TÜBA-GEBİP), 2017 METU Prof. Dr. Mustafa N. Parlar Research Incentive Award and 2018 Science Academy Association Distinguished Young Scientist Award (BAGEP).

Abstract

Microfluidics and lab-on-a-chip technology offers unique advantages for next generation devices for biotechnology applications. There are many challenges to overcome from scientific and engineering point of view to develop microfluidic technologies for biotechnology. One of the challenges is the efficient and precise manipulation of bio-particles within microchannels. Several groups have been proposed many different techniques such as hydrodynamic, electro-kinetic, acoustic etc. for manipulation of bio-particles. These manipulation technologies can be employed for separation of blood plasma from cells, transport of certain population of cells/microorganisms into a sensor area, isolation of microorganisms from cell population. In addition to manipulation of bio-particles, selection of microfluidic chip material and development of fabrication processes are also other challenges which directly affect the performance of microfluidic devices. Furthermore, development of efficient

simulation tools is also essential for further development of microfluidic devices. In this talk, several different techniques for manipulation of bio-particles will be overviewed, and different manipulation techniques, simulation and fabrication strategies employed for different applications within our research group will be presented.