

IMCB Invited Speaker



Speaker : Dr. Ewa Paluch
*Group Leader, MRC Laboratory for Molecular Cell Biology,
University College London, UK*

Date : 10 April 2014, Thursday

Time : 11:00AM - 12:00PM

Venue : IMCB Seminar Room 3-46, Level 3, Proteos, Biopolis

Host : Dr. Weimiao Yu

Seminar :

Plasticity and physical mechanisms of cell migration in confinement

Cell migration requires directional polarization, usually achieved by the formation of a leading edge protrusion. Cells migrating in three-dimensional environments can form various protrusion types, including actin-filled lamellipodia and actomyosin contractility-driven blebs. The ability to switch between protrusion types has been proposed to facilitate motility in complex environment. However, the minimal requirements of such plastic transitions are not known. Furthermore, the mechanisms underlying bleb-based migration are very poorly understood. Using Walker carcinosarcoma cells, which can form blebs and lamellipodia during migration, we showed that shifting the balance between actin protrusivity and actomyosin contractility is sufficient to lead to immediate transitions between protrusion types during cell migration. We then showed that bleb-based migration does not require specific substrate adhesions as long as the cells are placed in a confined environment. Using molecular and biophysical approaches combined with microfluidic engineering and physical modelling we showed that during bleb based migration, Walker cells use a friction-based mechanism, translating intracellular cortical flows into forward movement. Such a mechanism of locomotion, which does not rely on specific cell-substrate adhesions, may be advantageous for cells crossing multiple tissues, as it does not require the expression of tissue-specific receptors.

About the Speaker :

Ewa Paluch, studied Physics and Mathematics at the Ecole Normale Supérieure in Lyon, France. She did her PhD at the Curie Institute in Paris under the shared supervision of Cécile Sykes and Michel Bornens, investigating actin networks mechanics in vitro and in simplified cellular systems. She graduated in 2005 and moved to Dresden, Germany in 2006 to start her Research Group at the Max Planck Institute of Molecular Cell Biology and Genetics, as a joint appointment with the International Institute of Molecular and Cell Biology, Warsaw. She has been appointed Professor of Cell Biophysics at University College London in January 2013 and has recently moved her laboratory to the MRC Laboratory for Molecular Cell Biology, University College London. Ewa's laboratory investigates the principles underlying cellular morphogenesis. Since cell shape is ultimately defined by cellular mechanical properties and by the cell's physical interactions with its environment, biophysical approaches are essential to understand cell shape control. The lab combines cell biology, biophysics and quantitative imaging, and works in close collaboration with theoretical physicists, to investigate the regulation of the cellular actin cortex, and the function of cortical mechanics in cell shape regulation.