



DEPARTMENT OF MECHANICAL ENGINEERING
AND
MEDICAL ENGINEERING PROGRAMME

SEMINAR

Online

Title: Modelling the adhesion and spreading of cells mediated by the mobility and binding kinetics of ligand molecules

Speaker: Miss WU Di (PhD candidate)
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Date: 30 April, 2021 (Friday)

Time: 2:00 p.m.

Zoom Link: 1) Link to join the meeting:

<https://hku.zoom.us/j/96469760668?pwd=bURqNWl0RjlsQWlmUzV4cTJlENllpdz09>

2) Meeting ID: 964 6976 0668

3) Password: 666666

Abstract:

In order to perform biological duties such as differentiation and migration, cells need anchor themselves and then spread on the extracellular matrix (ECM) through the formation of molecular bonds between transmembrane adhesion proteins like integrin and ligands from outside. Although previous studies have shown cell-ECM attachment is heavily influenced by factors like the stiffness, geometry, and spatial ligand patterning of the substrate, the question of how cell adhesion and spreading are regulated by the mobility of ligand molecules remains elusive. Here, we propose a modeling investigation to address this important issue. Specifically, by adopting the Brownian dynamics approach, the random movement of ligands is captured by assigning a stochastic force along with a viscous drag on them. After that, the formation/evolution of adhesion patches and subsequent spreading of cells can be analyzed in the classical motor-clutch model. From our preliminary Monte Carlo simulations, a biphasic relationship between the adhesion and ligand diffusivity was obtained, resulting in the maximized cell spreading at intermediate mobility of ligand molecules. Comparison between these predictions with experiment as well as their biological implications will be presented and discussed.

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. Y. Lin at 3917 7955.

Research area: Biomedical Engineering