Centre for Biosystems Science and Engineering

Seminar

Single-molecule nano photonics and nano fluidics

on

20th December 2016,
4:00 PM, MRDG Seminar Hall, 1st Floor, Biological Sciences Building

by

Dr. Siddharth Ghosh
Debye Institute for Nano materials Science, Utrecht, Netherlands.

During the past 27 years, single-molecule fluorescence detection has majorly benefited the field of biophysics by providing a high spatiotemporal resolution. The 2014 Nobel Prize in Chemistry was awarded to Hell (Goettingen), Moerner (Stanford), and Betzig (Janelia) for their work in this field. The first single-molecule fluorescence was detected by Keller and coworkers (Los Alamos) in 1989. They were also first in separating DNA fragments using single-molecule fluorescence.

The speaker will talk about studying single nanometre scale objects in a controlled manner in a liquid solution, an open problem originally proposed by Keller and now solved. He will also explain the development of a one-dimensional nano fluidic device, which confines single molecules in two dimensions and generates a one-dimensional flow by using a high-throughput nano fabrication process using electron-beam lithography, reactive ion etching, and shadow-angle-electron-beam deposition to prepare the required nano fluidic device. This nano fluidic device was able to detect single organic dye molecules, nano dots, and small DNA molecules using two-foci fluorescence correlation spectroscopy.

Finally the speaker will discuss his current work on integrating opto-nanofluidic devices to study problem like protein misfolding and aggregation at single-molecule level.

About the speaker

Siddharth is a postdoctoral researcher at the Debye Institute of Nano materials Science working on non-dissipative single-molecule detection techniques. He did his PhD in Physics on Nanoscale Photonics from the International Max Planck Research School for Physics of Biological and Complex Systems, Goettingen, Germany, where he has worked on single-molecule nano fluidics and light-matter interaction in nano structures. He was awarded with an Excellence Doctoral Fellowship in 2013 from the International Max Planck Research School for Physics of Biological and Complex Systems. He has an MPhil in Mechanical Engineering from the University of Birmingham, UK (2012).