



JOHNS HOPKINS
BIOMEDICAL ENGINEERING

BME Virtual Seminar Series

Afshin Ahmadian, PhD

Professor

KTH Royal Institute of Technology

School of Engineering Sciences in (CBH)

Department of Gene Technology

SciLifeLab

Monday, April 18th, 2022

1:30 p.m.

Held via Zoom

Faculty host: Reza Kalhor



TBA

The objective of Afshin Ahmadian's research is to develop new molecular methods which enable fast, accurate, and cost-effective DNA diagnostics. Technological advances within DNA sequencing, the process whereby the order of the nitrogen bases in DNA is determined, make it possible to sequence millions of DNA fragments in a single run. However, despite the constant improvements within massive parallel sequencing (mps) techniques, the length of the DNA segment which is read is quite short. This poses major challenges in putting together complex organisms' genomes. Within clinical sequencing, phasing of genetic variations is of utmost importance. This is because the co-occurrence of variations can have a major impact on the regulation of genes and their expression. Due to the short read lengths in mps, this phase information is usually lost.

Ahmadian's research group has developed a new technique that addresses these issues. These techniques allow short readings to be traced to significantly longer DNA molecules. They use an innovative system for bar coding DNA, which is carried out in millions of microscopic water droplets in oil. In this way, it has been possible to label the content of each droplet and reconstruct long segments of DNA after mps. The technique has recently been used to phase-define the complete HLA-A gene, the human leukocyte antigen. This can help to increase the success of organ transplantation.