Semen VASILEV

Technology centre: Pharmaceutical Manufacturing Technology Centre (PMTC), UL
Academic Mentor: Dr. Emmet O'Reilly
Commercial Partner: GlycoSelect
Commercial Mentor: Mr. Robert Dunne

Semen received his Master's degree in 2012 from the Ural Federal University, Russia, where his work was focused on the Creation of hydrophobic structures on the metal surface by laser ablation. The same year he commenced his Doctoral degree at Ural Federal University conducting his research on Piezoelectric, pyroelectric and elastic properties of diphenylalanine microtubes. In 2016 he defended his PhD Thesis. To date his research has been published in 15 articles in peer-reviewed international scientific journals and 2 conference articles.

Dr. O'Reilly

Dr. O'Reilly has a track record of publishing in high impact journals and securing research funding. His previous experience of working with world renowned research teams in Australia and France as a Marie Curie Research Fellow have enabled him to develop significant international collaborations and contacts. He is an active member of the newly formed Bernal Institute and currently sits on the University Research Committee. He presently collaborates on a number of privately funded research projects including the newly formed Johnson and Johnson MD&D Automation Centre of Excellence based at the University of Limerick. To date Dr O'Reilly has secured €987,916 in direct research funding as a PI and in excess of €3 million as a Co-PI. In 2015 he was a successful co-applicant on an SFI-Spokes award involving University of Limerick and the medical device manufacturer Johnson & Johnson leading to the formation of the Momentum research project.

Mr. Robert Dunne

Robert is an experienced executive with 39 years of experience in the pharmaceutical industry. He has worked in operations, project management and business development roles across multinational and indigenous companies. Robert is responsible for the overall direction of GlycoSeLect, business development and the management of strategic partnerships.

Pharmaceutical Manufacturing Technology Centre

The Pharmaceutical Manufacturing Technology Centre (PMTC) is a leading industry informed research centre focused on developing advanced technology solutions for all stages of pharmaceutical manufacturing. The market-focused research delivers solutions to contemporary issues currently facing the pharmaceutical industry. The PMTC is hosted at the University of Limerick with core funding from the Irish Government, supplemented with co-funding from industry and leveraging further research funding. Company engagement allows the PMTC to execute world-leading, industry relevant research in advanced technology solutions to address contemporary manufacturing issues across the pharmaceutical sector.

GlycoSelect

GlycoSeLect Ltd specializes in the development of technology for the detection, analysis and purification of I products with glycoprotein chemistry. Our technology is based on Recombinant Prokaryotic Lectin (RPLs) chemistry. RPLs enable simple, fast and efficient detection, separation, analysis and purification of intact glycosylated biomolecules, such as biomarkers, mAbs and vaccines. The latter two form the majority of the new products in the pharmaceutical industry development pipeline which require accurate biomarker research and development to validate their therapeutic efficacies.

Semen's project

"JETLECT - Ink-Jet Printed Recombinant Prokaryotic Lectins for Point-of-Care Biomedical Diagnostics and High Throughput Biomedical Screening"

This project aims to exploit recombinant prokaryotic lectins (RPLs) for applications in the detection of disease biomarkers and biopharmaceutical screening. Lectins are protein-based molecules with the capacity to bind to sugar moieties thereby detecting/capturing said molecule.

Many disease biomarkers, viruses and biopharmaceutical products contain these regions making them suitable for detection by lectins. RPLs are lectins produced by bacteria such as E.coli and have significantly higher binding affinities and are cheaper to produce than plant-based lectins. This project will develop the methodologies for ink-jet printing RPLs in a high-density format with specific orientations, for use as diagnostic sensors for disease detection and high throughput screening of biopharmaceuticals.

Previous technologies utilized for each of these applications are based on monoclonal or recombinant antibodies. RPLs are significantly smaller and have higher affinity than antibodies. This makes them ideal materials for assay development as due to their smaller size more RPL molecules can be printed onto a single area while still maintaining high affinity for the target analyte.

The project will be divided into three complimentary work packages. Work package 1 will focus on developing the methodologies and techniques for ink-jet printing RPLs in a high-density format on both electroactive (Biosensor applications) and chemically modified but inert (biopharmaceutical screening applications) substrates. Work package 2 will focus on developing point of care RPL based bio-sensing platforms by printing RPLs directly onto piezoelectric Diphenylalanine microtubes. Binding of an immobilized RPL to a specific target will result in a chemical change in the microtube leading to a measurable signal. Work package 3 will focus on developing RPL based arrays for biopharmaceutical screening applications. This will be achieved by printing differing RPLs in a high-density format suitable for screening of biopharmaceuticals with multiple structural variations.