Hossein RAJABINEJAD

Technology centre: The Irish Composites Centre (IComp),
Academic Mentor: Prof. Parvaneh Mokarian-Tabari
Commercial Partner: DePuy Ireland Unlimited Company
Commercial Mentor: Dr. Tim Crowley

Hossein received his master's degree in IA University (Sci&Res), Tehran (Iran), focusing on Producing nanofiber from PET bottles via melt-electrospinning. In 2013 Hossein started his doctoral degree in chemical engineering from Erasmus Mundus Joint Doctorate programme at Politecnico di Torino, Italy association with Gheorge Asachi Technical University of Iasi (Romania) and Soochow University (China), doing research on "Keratin and Silk Based Material For Perspective Bio-Application".

Prof. Parvaneh Mokarian-Tabari

Prof. Mokarian in an expert in polymer physics and block copolymer self-assembly. She is the co-founder of an innovative technology called Zeroptica based on Self-assembly of block copolymers for patterning optical and curved surfaces. Her group won the Best Innovation Award in SPIE (the largest Optics Community in the world) in 2016. She has successfully coordinated a large European consortium with 13 partners.

Dr. Tim Crowley

Dr. Tim Crowley has a PhD in material chemistry. His doctoral research was in the synthesis and characterization nanowires, grown in block copolymers templates. Dr. Crowley has been working on medical device coatings for more than 10 years. He is an expert in technology development. design for manufacture, nanoporous coating, and thin films. He works in the area of commercialization of new coating technologies at DePuy Ireland UC.

The Irish Composites Centre (IComp)

The Irish Composites Centre (IComp) was established in 2010 under the EI/IDA Technology Centres initiative. It is hosted by the University of Limerick (UL), working in partnership with University College Dublin (UCD), Athlone Institute of Technology (AIT) and NUI Galway (NUIG). IComp provides world class innovative R&D, consultancy and networking opportunities for industry throughout Ireland and across all sectors where there are opportunities to use composite materials and associated technologies. IComp provides the focal point in Ireland for academia and industry to work together to address some of the critical issues related to the use of composite materials which have been identified by IComp industrial members who include companies from the supply chain and, for example, the aerospace, land transport, construction, marine and renewable energy and consumer goods sectors.

DePuy Ireland Unlimited Company

The DePuy Synthes Companies are part of the Johnson & Johnson Family of Companies. Today, DePuy Synthes, parent company of DePuy (Ireland) Unlimited, employs approximately 18,000 people across 60 countries. DePuy Synthes offer the world's most comprehensive portfolio of orthopaedic and neuro products and services for joint reconstruction, trauma, spine, sports medicine, neuro, cranio-maxillofacial, power tools and biomaterials. These products are distributed and implanted across the world served by a global manufacturing network which spans North America, Europe (UK, Ireland, Switzerland & Germany) and Asia. DePuy Synthes established a manufacturing facility in Ringaskiddy, Cork in 1997 that is focused on joint reconstruction. Today, the Cork facility is the largest manufacturing plant in the company and also houses an Innovation Centre and Global Supply Chain Centre.

Hossein's project

"Fabrication of Nano-patterned Hydroxyapatite/Collagen Implant for Bone Tissue Engineering"

Osseointegration is the direct structural and functional connection between living bone and the surface of a load-bearing orthopaedic or dental implant. In joint reconstruction surgery implants that promote osseointegration have positive benefits for patient outcomes.

Hydroxyapatite (a natural ceramic, also found in teeth) and Collagen (a natural polymer, also found in skin and tendons) are both essential components of bone structure. By combining these two bone-building components and designing the new type of physical surface structure of the implant material on a biological scale, we aim to develop implant surfaces with increased compatibility with human tissue growth factors. This aims to accelerate the rate of osseointegration post-surgery.

The new method of nanofabrication which we will use for this research will extend the application of innovative surface modification to the biomedical arena.