



# Carlos-Isam BACHOUR SIREROL

**Technology centre:** IComp - Irish Centre for Composite Research, NUI Galway

**Academic Mentor:** Dr. Noel Harrison, Dr Terry McGrail

**Commercial Partner:** ÉireComposites

**Commercial Mentor:** Dr Tomás Flanagan

Carlos holds a B.Eng in Industrial Engineering specialized in Industrial Chemistry and a M. Eng in Materials Engineering from Rey Juan Carlos University (URJC-Madrid). Additionally, he holds a second M. Sc in Structural Materials for New Technologies URJC-Madrid and from Carlos III University of Madrid.

Carlos also accumulated a wide industrial experience in which he dealt with quality control of composite materials applying advanced characterization techniques related to the aerospace, construction, energy and maritime sectors. In this regard, Carlos has highly engaged with industry being involved with R&D Departments of leading edge companies such as AIRBUS, ACCIONA or ABENGOA Solar.

He also engaged with academia, being involved with an extensive testing campaign in the framework of the FIBRESHIP EU-H2020 Project conducted by the University of Limerick, which aims to overcome the current market challenges and technology gaps to make viable the building of commercial vessels longer than 50 m in composite materials. He also has experience in Project Management and coordination of public-funded projects within the international and national (i.e. Spanish and Irish) domains, where he took the responsibility of coordinating projects for the Irish Composite Centre (IComp).

## Dr. Noel Harrison

Dr Noel Harrison is a permanent Above the Bar lecturer in Mechanical Engineering in the College of Engineering and Informatics at NUI Galway since January 2016. He has a significant track record in advanced computational mechanics, experimental testing and 3D microscopy. He has 10 years' experience in applied and fundamental research. He holds a number of patents for novel orthopedic devices and has won €1.1M in applied research funding for technology development and device design up to TRL 8. Dr Harrison also has direct access to the Irish Centre for High End Computing large-scale computer (7680 core) infrastructure.

## Prof. Terry McGrail

Dr Terry McGrail has been Director and Technology Leader of the IComp since 2010. He has strong industrial R&D experience with ICI plc and Cytec Engineered Materials focused on fibers, polymers and composites for aerospace and F1. For his outstanding contribution to the science and technology of composites, he was awarded the Burchall Medal by the Royal Society of Chemistry in 2009, the Leslie Holliday Prize by the Institute of Materials in 2018 and the Cytec Certificate of Excellence for Leadership in Innovation in 2005. His publications include over 20 international conference papers, 47 peer reviewed literature publications and 48 patents, which have ring-fenced areas of science and technology for ICI, Cytec Engineered Materials and the University of Limerick.

## Dr Tomás Flanagan

Dr Tomás Flanagan (Managing Director at ÉireComposites) has a PhD from the University of Cambridge Engineering Design Centre, focused on design project planning and management with special emphasis on simulation and risk analysis. He previously worked in roles as Turnaround Project Manager at BP Norway and Offshore Construction team lead in BP Angola. He has also held roles in change management and in-house consulting within BP. Prior to joining BP, Tomás gained experience in process model elicitation at Perkins Engines and Rolls Royce Aerospace as well as fatigue testing at Boeing Commercial Aircrafts Group. On top of all these, at ÉireComposites he plays the role of principal investigator for the H2020 PowderBlade and Seaboat projects, which are worth over €4 million all together.

## The Irish Composites Centre (IComp)

The Irish Composites Centre 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. Among IComp industrial members, there can be found companies from various sectors, such as supply chain and the aerospace sectors, or land transport, construction, marine, renewable energy and the consumer goods sectors.

## ÉireComposites

ÉireComposites Teoranta is an innovative design, manufacturing and testing company, involved in lightweight, high performance, fibre-reinforced composite materials, with an international customer base in space, aerospace and industrial composites. ÉireComposites offers its customers an integrated service including accredited design, innovative tooling, manufacturing and testing in a single organisation. The company is delivering composite components and assemblies for international aerospace programmes and has an active participation in important European Union R&D programmes in the aerospace and maritime sectors.

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## Carlos's project

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### “High Performance Thermoplastic Composite Pipeline Development with Automated Tape Placement (ATP) Technology – “ATP Pipeline” – for Energy Industry Applications”

Pipes are used to transport various forms of matter, and the design of pipelines depends on what the matter is (e.g. liquid, gas), conditions (e.g. the temperature, the pressure) and the types of loads and environment that the pipe is installed in (e.g. off-shore, underground).

This project (named "ATP Pipeline") focuses on the potential for traditional pipe materials (e.g. steel) to be replaced by composite materials (combination of two or more materials that give high strength-weight ratios). It will include examination of the requirements for the pipes based on the transported materials (Oil, Gas and condensed CO<sub>2</sub>), and the harsh dynamic underwater conditions where the pipe is installed.

Additionally, this project will deal with the development of a dual-purpose piping (oil & gas extraction and CO<sub>2</sub> underground delivery) from novel recyclable composite (lightweight) materials, using a recently developed thermoplastic manufacturing technique – Automated Tape Placement (ATP). To achieve these goals, “ATP Pipeline” will rely on the expertise of an international consortium formed by two companies (ÉireComposites and Wood Group), two technology centres (The Irish Composites Centre – IComp and Irish Manufacturing Research – IMR), two Irish universities (National University of Ireland Galway and University of Limerick) and one Spanish university (Rey Juan Carlos University).

Carlos will conduct an ambitious research plan covering all needs in terms of business analysis, design and simulation, advance composite manufacturing, lab-scale and industrial scale testing, scaling up and life cycle analysis of high performance pipelines. Moreover, Carlos will conduct a complete Career Training and Development plan, capable of covering a wide range of technical and management skills directly transferable to the company partner (ÉireComposites). In addition, he will go through an intensive secondment divided in three blocks along the project supported by a wide spectrum Dissemination & Community Outreach Plan.

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