



Applications are invited for a PhD studentship for the following project:

Theory, modelling and simulations of electrical properties of nanosheet networks for device applications

The position will be based with the group of Prof. Mauro Ferreira at the School of Physics at Trinity College Dublin and be part of the Engineered functional materials platform within the Advanced Materials and Bioengineering Research Centre (AMBER) centre.

Summary of project:

Networks made of 2D nano-sheets have been attracting a lot of attention due to their promising physical properties and their potential use in batteries and sensor devices. Unfortunately, it is particularly challenging to accurately predict their behaviour due to the heavily disordered nature of these networks. The goal of this project is therefore to develop simple yet accurate theoretical models and computational tools capable of describing the electrical properties of these materials. The project aims to apply concepts of Condensed Matter Theory to account for the disorder of 2D networks and separate the problem in two complementary parts: one involving the development of a macroscopic model and another which consists of the microscopic details of the network. This will provide a platform to describe not only the electrical capabilities of 2D networks but one that can be extended to investigate other features such as optical, thermal and magnetic properties, to name but a few. Despite the theoretical nature of the project, the student will work in close collaboration with experimental groups within AMBER.

Requirements: The ideal candidate will have a 1st Class Honours Bachelor's degree in Physics or a related discipline.

Desired abilities: Excellent mathematical and computational skills are required; Solid background in Solid State Physics is expected. Excellent written and oral communication skills are essential.

How to Apply: Send a CV including the names and contact details of three referees to Prof. Mauro Ferreira (ferreirm@tcd.ie), School of Physics, Trinity College Dublin.

Positions will remain open until filled but preferred start date is *September 2 2019*. Only short-listed applications will be acknowledged.

This position is funded by the SFI-research centre AMBER.

The AMBER research centre, as a community of researchers, welcomes its responsibility to provide equal opportunities for all. We are actively seeking diversity in our research teams and particularly encourage applications from underrepresented groups.

References:

- [1] "Emergence of winner-takes-all connectivity paths in random nanowire networks", Nature Communications **9**, 3219 (2018)
- [2] "Sensitive Electromechanical Sensors Using Viscoelastic Graphene-Polymer Nanocomposites", Science **354**, 1257 (2016)