Applications are invited for the following PhD studentship:


The position will be based with the Nanothermal research group of Prof. David McCloskey (https://www.tcd.ie/Physics/research/groups/nanothermal/) at the School of Physics (https://www.tcd.ie/Physics/), in Trinity College Dublin (https://www.tcd.ie/) and be part of the Materials for Energy platform within the Advanced Materials and Bioengineering Research Centre (AMBER) centre (http://ambercentre.ie/).

Summary of project: Conventional thermoelectric materials enable a coupling between electric current and heat flow. They can be used to harvest electricity from waste heat, as solid-state heat pumps, or as temperature or heat flux sensors. Transverse thermoelectric materials, are artificial materials produced by stacking skewed alternating layers of metal and semiconductor. They fundamentally differ from conventional thermoelectric materials in that heat flux and electric current flow in different directions. This allows independent optimization of thermal and electrical conductivity in these directions. The transverse thermoelectric concept has recently been shown to be viable for high power density harvesting of waste heat under high heat flux conditions such as in liquid-liquid heat exchanger applications1.

Project Description: In the project we will explore the transverse thermoelectric concept using advanced materials and processing techniques available through the AMBER research centre. In particular the student will develop a range of transverse thermoelectric materials and device geometries for testing under extremely high heat flux conditions such as evaporative cooling. This will allow us to explore the limits of electrical power density that can be achieved with these devices. We will also explore practical limitations in realistic devices due to interface resistance and search for optimal fabrication techniques. The student will have access to state of the art fabrication and characterisation facilities through the Additive research Lab and the advanced microscopy Lab (http://ambercentre.ie/facilities/), as well as customised setups designed in the Nanothermal research group.

References:

[1] Breaking the trade-off between thermal and electrical conductivities in the thermoelectric material of an artificially tilted multilayer, Akihiro Sakai et.al., Scientific reports, 4 : 6089

How to apply: We are seeking applications from EU students. The ideal applicant will have a 1st Class Honours Bachelor’s degree in Physics or Engineering related discipline. The researcher will work closely with other members of a multidisciplinary project team. Excellent english written and oral communication skills are essential.

This is a fully funded project with duration of 4 years starting in 2019. The student stipend will be set at €18,500 p.a. and additional funding has been allocated to support consumables and travel expenses.

CVs with the names and addresses of two referees should be emailed to Prof. David McCloskey at:

mccloskd@tcd.ie

Positions will remain opened 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.