



Position Title	PhD Studentship - Simulation of switching mechanism of 2-D materials for flexible electronics
Project Abstract	<p>Two-dimensional (2-D) semiconductors such as molybdenum disulphide have commercial potential as transistor components and light emitting agents in novel large scale, inexpensive, non-toxic displays and optoelectronics. They can be deposited using inkjet-printing techniques, which result in 'flexible' electronics. When 2-D semiconductors are immersed in an ionic liquid, application of a gate voltage can switch them on or off so that they display transistor behaviour. The 2-D character of these materials means that electronic circuits can be created from liquid-exfoliated nanosheets [1] using inkjet printing technology [2]. These are immersed in an ionic liquid (IL), and a small gate voltage (2 V) is applied between an electrode in the liquid and a back-electrode underneath the nanosheet network. The resulting transistor is gated by the potential of the electric double layer (EDL) formed when the gate potential is applied.</p> <p>Displacement of ions in an IL in a potential gradient generates an EDL at the semiconductor/IL interface. The resulting electrostatic potential in the semiconductor generates charge carriers in the semiconductor. The Coleman group in AMBER is developing this technology in the laboratory.</p> <p><i>The aims of this project are to advance understanding of switching mechanisms of IL gated 2-D semiconductors using molecular dynamics (MD) and density functional theory (DFT) and to increase the innovation rate in IL gated 2-D semiconductors in the Coleman group.</i></p>
Experience	The PhD position is funded for 4 years, including a monthly stipend and materials and travel budget. Applicants should hold a minimum of an honours bachelor's degree at 2:1 level or equivalent in a relevant subject such as Physics/Materials. Candidates should also have a strong interest in 2D Materials.
Funding	The studentship will cover fees up to €5,500 pa and a stipend of €18,500 pa
Location	TCD
Closing Date	Friday 29 th June 2018
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