





Magnetics and Microhydrodynamics, from guided transport to delivery

ESR 12 Surface wettability and electronic structure

Research project	<p>The contact angles of water on boron nitride and graphite are strikingly different [1]. The former is moderately hydrophilic whereas the latter is hydrophobic. A consequence is the remarkable ability of water to flow with little pressure gradient through individual carbon nanotubes, in contradiction to the no-slip boundary condition that applies for structurally-similar boron nitride. This points to a link between hydrodynamic flow and the electronic structure of the confining material. This project will systematically investigate the origin of the effect, looking at the influence of electronic structure, surface charge, termination and roughness on surface tension and wettability. Magnetic field effects will be studied as well, both on free droplets and surfaces. Results will be applied it in the context of microfluidics without walls, working in tandem with ESR 11, and taking advantage of the experience of UPV/EHU in microfluidics, and the theoretical expertise of LU. Technology transfer to a microfluidics company is envisaged.</p> <p>[1] W. Secchi et al., <i>Nature</i>, 537 (2016), 210.</p>
Supervisor	<p>Name: Michael Coey e-mail: jcoey@tcd.ie website: https://www.tcd.ie/Physics/research/groups/magnetism/</p>
Host Institution	<p>Trinity College Dublin</p>   <p>MAGNETISM & SPIN ELECTRONICS TRINITY COLLEGE, DUBLIN</p> <p>School of Physics, Magnetism and Spin Electronics Group Trinity College, Dublin 2, Ireland. https://www.tcd.ie/Physics/</p>
Required profile	<p>The candidate should hold a good honours or master's degree in Physics or Chemistry, with a strong background in condensed matter, fluids or physical chemistry, and an interest in magnetism They should have a passion for interdisciplinary research. Stays are planned at the University of the Basque Country (UPV/EHU), the University of Latvia (LU Riga) and with a French microfluidics company. The candidate should not have lived in Ireland in the past 12 months.</p>