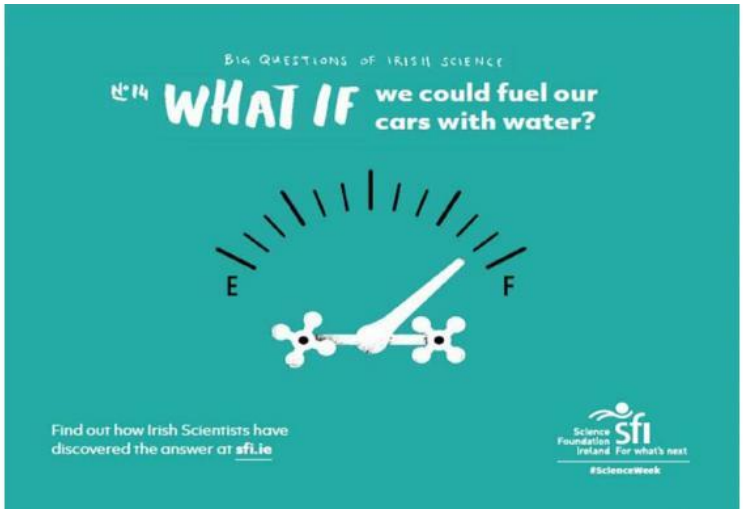
TEECE water splitting work in the limelight.

The Trinity Electrochemical Energy Conversion & Electrocatalysis (TEECE) Group headed by Professor Mike Lyons and based in the School of Chemistry TCD and the AMBER National Centre, has been the focus of public attention recently particularly with respect to their work (in collaboration with the Groups of Professor Paula Colavita and Professor Georg Duesberg) in the development of catalytic electrode materials for water electrolysis, a process which is used to generate clean hydrogen fuel for subsequent use in hydrogen fuel cells. Hydrogen has been described as the ultimate clean energy source, it's seen as very attractive as it is a pollution free fuel and energy carrier which would satisfy much of the energy requirements of our society. Science Foundation Ireland featured the Groups work in their recent advertising campaign for Science Week with adverts appearing in Dublin Airport containing the intriguing title: 'What if we could power our car with water?' (http://www.sfi.ie/ , http://www.sfi.ie/news-resources/press-releases/what-if-we-could-fuel-our-cars-with-water.html) This question is based on a recently published paper which describes the PhD work of Ms Michelle Browne and concerns the development of new high activity low cost metal oxide based electrodes based on earth abundant non critical raw materials which generate molecular oxygen at unprecedented low overpotential. This translates into rapid molecular oxygen product formation at low energy cost. The practical import is that water electrolysis to generate hydrogen fuel and oxygen will now become much more economically viable since the oxygen overpotential constitutes the major source of energy inefficiency in the electrolysis process. This work has been published in the journal ACS Catalysis. The link is: http://pubs.acs.org/doi/full/10.1021/acscatal.5b02069 .



The TEECE Group has also developed metal oxide materials which offer significant potential for the selective electrolysis of sea water. Usually if a current is passed through sea water hydrogen and chlorine gas will be formed unlike what is observed in pure water where hydrogen and molecular oxygen are formed. Chloride ion in the sea water is preferentially oxidized to chlorine gas at the anode, because at most electrode surfaces, chloride ion oxidation is kinetically more favourable than water oxidation to molecular oxygen. What makes the TEECE anode materials interesting is that they are selective for water oxidation to form molecular oxygen rather than chlorine. This opens the exciting vista of using ocean water, our most earth abundant raw material as a source of hydrogen fuel using wind or sunlight to power electrolysis. Professor Mike Lyons presented these ideas recently at TEDx Tallaght in a talk entitled 'Our Hydrogen Future'.

A link to this talk is provided here: https://www.youtube.com/watch?v=klA41jyscKw&t=40s

Exciting times indeed for TEECE. 2016 was a productive year.