

Best Analytical Chemistry Poster at Environ 2022

Winner Padraig McDonagh, Atlantic Technological University (Donegal)

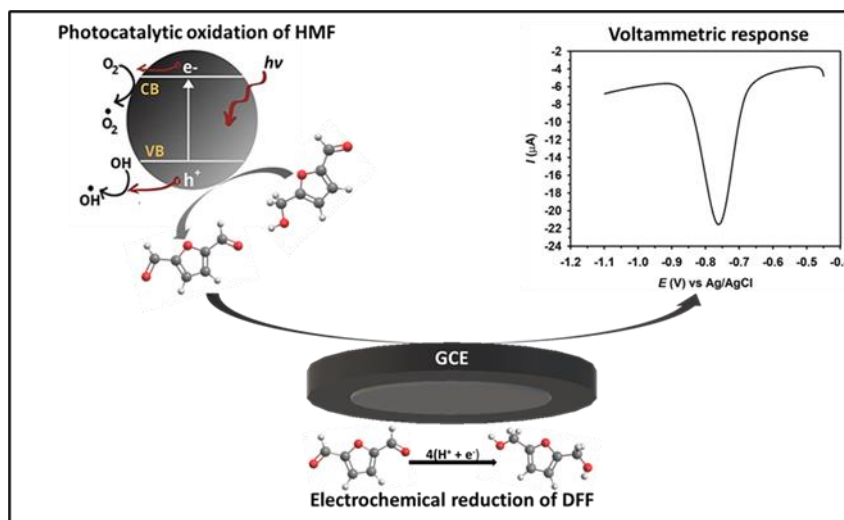
Electrochemical in-situ sensing of key value-added compounds from the photocatalytic valorisation of biomass

Depletion of fossil fuel resources, and their associated environmental concerns has increased awareness of the need for sustainability in chemical and energy production. Biomass is a renewable organic waste material available worldwide in large amounts – approximately 200 billion tonnes each year. Therefore, the effective reforming of biomass can play a vital role in the sustainable



carbon neutral production of value-added chemicals. Due to its mild operating conditions, photocatalysis has emerged as an innovative approach for the sustainable production of value-added chemicals from biomass resources. While the last decade has seen interest increase in this area and with-it subsequent improvements in the technology, there remains a number of key challenges in optimising the process as a whole. One such challenge is in the development of in-situ detection methods that can be incorporated into reactor systems. Development of these rapid detection methods can ensure maximum efficiency of the reforming process, while also providing a crucial insight into the fundamental mechanism and kinetics occurring during the photocatalytic reaction.

My PhD research at Atlantic Technological University Donegal focuses on the development of sensor based electroanalytical methods to monitor



the products from the photocatalytic reforming of biomass derivatives. This project aims to develop highly selective and sensitive sensors for the determination of a number of key platform chemicals of interest. Part of this ongoing work was presented at Environ2022 in a study to develop a rapid, selective and accurate method for the electrochemical determination of 2,5-diformylfuran from the photocatalytic oxidation of 5-hydroxymethylfurfural (which is currently being prepared as a manuscript for publication).