Centre for Sustainable & Circular Technologies

UNIVERSITY OF BATH

Centre for Sustainable and Circular Technologies; University of Bath

Project Title:	Chemical Recycling of Commodity Polymers
Lead Supervisor and co-supervisors:	Prof Matthew Davidson (Lead) Prof Matthew Jones
Industrial Partner:	To be confirmed

Project Summary

Chemical recycling of commodity plastics is a topic of growing importance and interest in the drive to achieve Net Zero by 2050 and in order to minimize the environmental impact of plastics. The use of plastics in biomedical applications is a significant and rapidly growing area of consumption for single use plastics, and one that has been highlighted during the current coronavirus pandemic. In this project we will develop of suite of catalysts for the chemical degradation and depolymerization of a range of polymers (e.g. polyethylene, polycarbonates and polyesters), targeting materials that are commonly used in this growing application area, particularly those plastics used in single-use biomedical devices for personalized medicine. This project will build on the expertise of the Davidson and Jones groups at Bath whose research focuses on the development of new, sustainable catalysts and process for chemical recycling.[1-3]

In this project we will focus on the following:

1. Optimisation of single feedstock catalytic chemical recycling processes

2. Development of new processes for recycling mixed feedstocks (e.g. binary mixtures of polycarbonate/polyethylene)

[1] J. Cleaner Prod. 2021, 293, 126123; https://doi.org/10.1016/j.jclepro.2021.126163 [2] Green Chem. 2020, 22, 3721; DOI: 10.1039/D0GC01252A [3] ChemSusChem 2019, 12, 5233; https://doi.org/10.1002/cssc.201902755

Sustainability issues addressed

Synthetic polymers are some of the most commonly used materials in our daily lives, with production increasing over 20-fold since the 1960s. In 2017 an estimated 8.3 billion metric tonnes of plastic had been cumulatively produced, but only 9% of plastics ever manufactured have been recycled. Their longevity and increasing demand have resulted in plastic pollution in the world's oceans becoming one of the pressing challenges of our times. The coronavirus pandemic and the growth of personalized medicine have both highlighted the significant impact of single use plastics in the biomedical sector. This project aims to address this by converting commodity plastics used in biomedical devices into platform chemicals to be used in further process or to remake virgin polymer.

Eligibility criteria and selection process

Application:

Formal applications should be made via the University of Bath's online application form for a PhD in Chemistry. Please ensure that you state the full project title and lead supervisor name on the application form.

http://www.bath.ac.uk/guides/how-to-apply-for-doctoral-study/

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Funding Eligibility:

An URSA PhD studentship includes 'Home' tuition fees, a stipend (£15,609 per annum, 2021/22 rate) and research/training expenses (£1,000 per annum) for up to 3.5 years

Information may be found on our fee status guidance webpage, on the GOV.UK website and on the UKCISA website.