Catalysing sustainable chemical manufacturing from biomass

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The anthropogenic origin of climate change from combustible carbon, and desire to establish a global circular economy is driving the quest for new sustainable manufacturing processes [1]. Catalysis has a rich history of facilitating energy efficient, selective molecular transformations, and will play a pivotal role in overcoming the scientific and engineering barriers to sustainable and economically viable energy vectors and chemicals. This presentation describes challenges in the design of catalytic technologies for biofuels and platform chemicals synthesis [2].

Advances in the rational design of nanoporous solid acid and base catalysts enable the fabrication of hierarchical porous architectures [3] in which different active sites are spatially compartmentalised. Synergies between nanoporous solid acids and metal nanoparticles also facilitate active and selective upgrading of phenolic components of pyrolysis bio-oils to hydrocarbon fuels, and precious metal thrifting [4]. Active site compartmentalization and flow chemistry facilitates chemical cascades to produce valuable chemical intermediates [5].

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Adam received his BA and PhD from the University of Cambridge at which he also undertook a postdoctoral fellowship. He is Professor of Sustainable Chemistry at Griffith University, and previously held Chair appointments at Cardiff, Warwick, Monash, Aston and RMIT Universities. His research addresses the rational design of nanoengineered materials for energy and environmental applications. He is a Fellow of the Royal Society of Chemistry and Royal Australian Chemical Institute, Associate Fellow of the IChemE, Editor-in-Chief of M*aterials Today Chemistry*, and recipient of the 2011 McBain Medal, 2012 Beilby Medal and Prize, and 2023 RACI Welcome Award. Adam has co-authored >300 publications (h=index 81, 24861 cites) and is a co-investigator and Flagship Project co-lead on the recently funded ARC Centre of Excellence 'Green Electrochemical Transformation of Carbon Dioxide' GetCO2.