



NECEM WEBINAR: "Solid sorbents and molten membranes; surpassing conventional limitations of carbon dioxide separation devices"

Dr Greg Mutch, Royal Academy of Engineering Research Fellow;
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Newcastle University

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Via Zoom

To meet international climate change agreements we must remove carbon dioxide from large point sources and directly from the air. To do so, technologies involving sorbents and membranes are envisaged. Examples include: (i) amine scrubbing, the archetypal carbon dioxide removal process, where liquid amines are cycled between loaded and unloaded forms; (ii) calcium looping, where metal oxides sorbents are cycled between oxide and carbonate forms; and (iii) supported molten-salt membranes, where molten carbonate facilitates the transport of carbon dioxide. In this talk, Dr Mutch will discuss his work on enhancing carbon dioxide uptake on metal oxides and on overcoming the permeability and selectivity targets required to make membranes economically competitive with amine scrubbing. This work includes the characterisation of sorbents and membranes using cutting-edge techniques such as X-ray nano-tomography, as well as operando testing of sorbents and membranes in the challenging conditions they might face in use. Although traditionally considered as distinct technologies, significant overlaps exist between sorbents and membranes and thus, the benefits of working at the sorbent-membrane nexus will be discussed.

Biography



Dr Greg A. Mutch holds a 1st Class MChem (2013) and PhD in chemical engineering (2016), both from The University of Aberdeen. His PhD thesis, "Carbon capture and storage optimisation in solid oxides: understanding surface-fluid interactions", won a national PhD thesis prize from the Royal Society of Chemistry for "addressing clearly identified needs in the energy sector". He was awarded an EPSRC Doctoral Prize Fellowship to move to Newcastle University in 2016 to work on supported molten-salt membranes for carbon dioxide separation. In 2019, he secured a Newcastle University Academic Track Fellowship and in 2020 became a Royal Academy of Engineering Research Fellow. His current research is focussed on direct air capture.

He is a member of the UK Government Department for Business, Energy & Industrial Strategy CCUS Early Career Professional Forum, an academic member of the UK Carbon Capture & Storage Research Centre and provides expert advice to the Northumberland County Council Land Management and Emissions Capture Group and to the Science Media Centre.



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