Title: 3D printing for reaction engineering; some examples and an engineer's perspective

Bio: Dr Jonathan McDonough is a lecturer in chemical engineering at Newcastle University who has interests and expertise in the areas of reaction engineering, fluid mechanics, flow chemistry, fluidization, heat transfer and 3D printing. The latter in particular is heavily embedded in most of his research activities, and he sees this technology as one of the key enablers for realising next-generation equipment designs that are less energy-intensive, highly-sustainable, and high-performance. His research vision is to exploit the geometric complexity unlocked by 3D printing to create new chemical reactor designs that will revolutionise flow chemistry, and develop chemical processes more broadly.

Abstract: 3D printing has become increasingly popular in the last few years, owing to improvements in the technology, increased reliability, increased accessibility, access to a wider range of printable materials, and significant reduction in cost. In this talk, several case studies for the use of 3D printing in reactor engineering will be explored, which will be used to draw out the benefits that 3D printing provide in this context. These case studies include the creation of new flow reactor designs that unlock new operating windows, fabrication of micro-fluidised beds, and miniaturisation of the TORBED intensified reactor concept for adsorbent materials screening applications. Like most tools, 3D printing has its niche. This talk will therefore also offer a commentary on the future opportunities and challenges of 3D printing, which will hopefully raise awareness for the need for collaboration between engineers, chemists, and 3D printing specialists to achieve maximal impact.