L-224 **Printed Chromatography Media.** Conan Fee, Simone Dimartino, Suhas Nawada, University of Canterbury, Christchurch, NEW ZEALAND

Conventional chromatography media suffer from a number of limitations, including packing defects caused by random or improper packing and constraints on the individual particle geometries that are able to be packed effectively. Chromatography media in the form of beads usually have a distribution in size or, if not, are extremely expensive. Other media particles such as crushed glass or resins, pack with poor flow properties. Monolithic media, likewise, suffer a number of limitations, one being difficulty in casting large-scale columns because of non-uniformities that arise during in situ polymerisation caused by the rate of removal of heat of reaction. Monoliths also suffer from random packing effects. Many of the above limitations cause axial dispersion or poor flow properties such as high pressure drops and flow channelling. Three-dimensional (3D) printing is a new approach to solid synthesis, which is capable of creating media with exquisite control of packing geometry. For example, perfect alignment of identically dimensioned spheres into close- or dense-packing or a variety of regular packing arrangements; controlled sphere dimensions with each sphere placed into a desired position within a lattice; cubes that are aligned to touch at their corners; fibres aligned axially. Indeed, by 3D printing, within the constraints of printed resolution, one could produce an exact physical replicate of any computer model, including both perfect and deliberately imperfect geometries. This would allow one to test experimentally a packing geometry modelled by computational fluid dynamics e.g. a close-packed column of identical spheres with a single "imperfection" such as a flow channel. One could also print the separation media within the containing vessel, with all flow connectors in place and create a wide variety of geometries not currently available by conventional media synthesis or packing methods. In this paper, we show, for the first time, the versatility of this approach to column design through examples of flow through packed media designed in silica, then printed and tested experimentally.