# AUTOMATED HIGH-THROUGHPUT AND MINIATURISED SEMI-CONTINUOUS CHROMATOGRAPHY

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The major process limitations of current antibody purification processes are posed by affinity chromatography, although purification platforms based on affinity chromatography are very effective. Typically, protein A-based chromatography can account for more than 70% of downstream processing costs due to resin throughput, cost and complexity of scale up. Thus, there has been increased focus by the industry on developing and implementing continuous chromatography technology to increase resin capacity, reduce buffer consumption and increase productivity of packed bed steps.

At UCB we have publicly presented a novel semi-continuous operation that can be operated on an unmodified chromatography skid named SCRAM (Sequential Chromatography Recycling with Asynchronous Multiplexing), which replicates the functionality and capacity gain of traditional continuous systems without the complexity.

However, increasingly new innovative antibody formats have resulted in significant process platform adaptations to be performed prior to manufacture, and therefore the screening of many conditions to find a suitable window of operation may not be economically feasible at laboratory scale due to the amount of feedstream and resources required for each experiment. To overcome this issue, techniques that can generate data with minimal resource expenditure can be invaluable in early bioprocess development. Automated microscale platforms offer a change in bioprocess development by accelerating process development due to the flexibility for parallel experimentation and automation while requiring microscale quantities of material.

In an industry first, we will demonstrate the application of SCRAM using 600 uL microscale columns on an automated robotic platform performed in parallel to explore large experimental design spaces with minimal resource expenditure. This has resulted in critical bioprocess information to be obtained earlier in development providing a better opportunity to understand process parameters and robustness understanding of this application. Therefore, this approach can be a viable and valuable alternative route for identifying sweet spots during screening studies in bioprocess development.

Within the sector, automated high-throughput and miniaturised chromatographic process development relying on microscale columns is widespread, however, we believe this to be the first report of successful miniaturization of semi-continuous chromatography using microscale columns.