

Challenges and strategies in the preparation of large-volume polymer-based monolithic chromatography adsorbents

Abstract

To date, the number of published reports on the large-volume preparation of polymer-based monolithic chromatography adsorbents is still lacking and is of great importance. Many critical factors need to be considered when manufacturing a large-volume polymer-based monolith for chromatographic applications. Structural integrity, validity, and repeatability are thought to be the key factors determining the usability of a large-volume monolith in a separation process. In this review, we focus on problems and solutions pertaining to heat dissipation, pore size distribution, "wall channel" effect, and mechanical strength in monolith preparation. A template-based method comprising sacrificial and nonsacrificial techniques is possibly the method of choice due to its precise control over the porous structure. However, additional expensive steps are usually required for the template removal. Other strategies in monolith preparation are also discussed. © 2014 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim. To date, the number of published reports on the large-volume preparation of polymer-based monolithic chromatography adsorbents is still lacking and is of great importance. Many critical factors need to be considered when manufacturing a large-volume polymer-based monolith for chromatographic applications. Structural integrity, validity, and repeatability are thought to be the key factors determining the usability of a large-volume monolith in a separation process. In this review, we focus on problems and solutions pertaining to heat dissipation, pore size distribution, "wall channel" effect, and mechanical strength in monolith preparation. A template-based method comprising sacrificial and nonsacrificial techniques is possibly the method of choice due to its precise control over the porous structure. However, additional expensive steps are usually required for the template removal. Other strategies in monolith preparation are also discussed.

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