Versatility of polymethacrylate monoliths for chromatographic purification of biomolecules

Abstract

Polymethacrylate monoliths, specifically poly(glycidyl methacrylate-co-ethylene dimethacrylate) or poly(GMA-co-EDMA) monoliths, are a new generation of chromatographic supports and are significantly different from conventional particle-based adsorbents, membranes, and other monolithic supports for biomolecule purification. Similar to other monoliths, polymethacrylate monoliths possess large pores which allow convective flow of mobile phase and result in high flow rates at reduced pressure drop, unlike particulate supports. The simplicity of the adsorbent synthesis, pH resistance, and the ease and flexibility of tailoring their pore size to that of the target biomolecule are the key properties which differentiate polymethacrylate monoliths from other monoliths. Polymethacrylate monoliths are endowed with reactive epoxy groups for easy functionalization (with anion-exchange, hydrophobic, and affinity ligands) and high ligand retention. In this review, the structure and performance of polymethacrylate monoliths for chromatographic purification of biomolecules are evaluated and compared to those of other supports. The development and use of polymethacrylate monoliths for research applications have grown rapidly in recent times and have enabled the achievement of high through-put biomolecule purification on semi-preparative and preparative scales.