

CIM supports - short layered monoliths: New standard for analyzing and purifying biomolecules

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Monolithic supports represent a novel generation of stationary phases. As opposed to individual particles packed into chromatographic columns, monolithic supports are cast as continuous homogeneous phases. They represent an approach that provides high rates of mass transfer at lower pressure drops. Therefore, much faster separations are possible and the productivity of chromatographic processes can be increased by at least one order of magnitude as compared to traditional chromatographic columns packed with porous particles.

For the optimal purification performance of larger biomolecules, the chromatographic column needs to be short. This feature enhances the speed of the separation process and reduces the backpressure, unspecific binding, product degradation and minor changes in the structure of biomolecule which can change its antigenicity, without sacrificing resolution.

CIM Convective Interaction Media[®] (CIM[®]) supports combine the monolithic structure and short layered format and were designed for chromatographic analyses, in-process control, solid phase extraction and purification of target biomolecules, both on an analytical and on a preparative scale. CIM supports are methacrylate based, having a bimodal pore size distribution and available in many different chemistries and column volumes. Large channels with a diameter around 1.5 μm result in a low-pressure drop even at the elevated flow rates. Small channels and pores on the other hand, with a pore diameter below 100 nm, provide high surface area required to achieve high dynamic binding capacity.

The main advantages of this novel media are:

- Flow-unaffected properties with no loss of resolution or capacity even when extremely high flow rates are applied.
- Extremely high capacity for very big biomolecules (e.g. 10 mg of plasmid DNA/ml, 20 mg of genomic DNA/ml, 25 mg of Tomato Mosaic Virus/ml media).
- Fast and simple scale-up (units used for screening on the μL scale has the same characteristics as the one used for cGMP production).
- Their very short column length (some are only a few mm) minimizes conformational changes and inactivation of biomolecules and reduces unspecific binding.

The presented paper will discuss the use of CIM[®] for large biomolecules separation on laboratory and industrial scales.