Separation of synthetic peptides and proteins by polystyrene bound silica monolith particles as HPLC stationary phase

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Partially or fully sub-1 µm and sub-2 µm porous silica particles have achieved more interests as column packing materials in separation due to enhanced separation efficiency, fast separation and high separation resolution. Sub-1 µm porous silica monolith particles have been prepared successfully prepared by sol-gel process followed by grinding and calcinations at 550. A high-efficient HPLC stationary phase based on porous silica monolith particles has been prepared by reacting 4-chloromehtylphenylisocynate (4-CPI) to porous partially sub-1 µm monolithic silica particles via isocyanate-hydroxyl reaction using dibutyltin dichloride (DBTDC) as a catalyst followed by initiator attachment and RAFT polymerization of styrene. The resultant phase was packed in glass lined stainless steel micro-column (1.0 mm x 300 mm), and the separation efficiencies as high as 60,000 plates (200,000/meter) were achieved for the separation of peptides and proteins using 60/40 acetonitrile/50 mM ammonium format (v/v %) with at a flow rate of 25 µL/min. The separation efficiency of this new phase is comparable or even better than some of commercial available stationary phases. This phase has shown some encouraging possibility for fast analysis when packed in a short column. This study offers a promising vision towards commercialization of chromatographic phases based on silica monolith particles.

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