Controlling selectivity of polymer-based monolithic stationary phases

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In this work, we aimed in the preparation of monolithic capillary column allowing an isocratic separation of ten dopamine precursors and metabolites in a single run. Segments of five zwitterion sulfobetaine polymer monoliths have been modified by zwitterion phoshorylcholine by using a UV-initiated two-step photografting. Columns with 0, 33, 50, 66, and 100% of modified length were prepared. Effect of the length of the modified segment and mobile phase composition have been tested. All columns provided dual-retention mechanism with reversed-phase retention in highly aqueous mobile phase and hydrophilic interaction mechanism in highly organic mobile phase. Retention mechanism was controlled by a composition of the mobile phase and has been described by a three-parameter model. We have used regression parameters to characterize the retention of analyzed compounds and to study individual pathways of dopamine metabolism. Comprehensive optimization of mobile phase composition allowed to find an optimal composition of the mobile phase and stationary phase surface chemistry arrangement to achieve desired separation. Optimized columns provided an isocratic separation of all tested compounds in less than nine minutes.