

ABSTRACT

Department of Pharmaceutical Chemistry and Drug Analysis

Andrea Opavská

doc. PharmDr. Radim Kučera, Ph.D.

Modification of the capillary wall for the separation purpose I

In general, capillary electrophoresis is a separation method suitable for the analysis of charged molecules, eventually neutral substances. The interest in this method and its further modification (e.g. capillary electrochromatography) has been increasing in recent years, is developing. In the case of capillary electrochromatography, the development focuses mainly on the modification of the inner wall of the capillary. The purpose of this modification is in particular to introduce a stationary phase that would improve selectivity, as well as the modification of the electroosmotic flow.

The thesis deals with the modification of the internal capillary wall and the subsequent testing of the prepared capillary. One possibility is chemical coating. The second tested method is called Layer-by-Layer and represents the layering of variously charged substances in layers interacting with each other through electrostatic forces. In our work we used polycation poly(diallyldimethylammonium chloride) and graphene dispersion. The choice of graphene is very advantageous because it has excellent adsorption properties due to its morphological arrangement. 4-Aminobenzoic acid and 4-hydroxybenzoic acid, their esters, positional isomers of nitrophenols, and other substances were selected as model compounds for analysis.

Different parameters, such as pH and electrolyte concentration, and temperature effects on the separation course and the rate of analysis were tested. Measurements were lost during the measurement, especially in chemically coated capillaries. This phenomenon was attributed to the gradual elution of graphene. The method of coating the capillary by the Layer-by-Layer method proved to be a more appropriate way to modify the inner wall.

Keywords: capillary electrochromatography, capillary modification, graphene