Abstract:

Carbon is due to its electrochemical properties a favourite material for construction of electrodes suitable for detection in flow system. The two most often used techniques (coulometric and amperometric) will be discussed in this Thesis.

Carbon paste electrodes (CPE) represent the amperometric detectors. CPE are unstable in the medium with high content of organic solvents, which might complicate their application in HPLC, where the mobile phase contains organic component. It is interesting, that glassy carbon paste electrodes are more stable under such conditions. The change of surface and response of the electrode caused by the effect of methanol are described in this Thesis along with the possible reason of stability of GCPE. Roughing of the surface exposed to methanol is demonstrated by confocal microscopy. This effect leads to increase of height of the peak, background current and noise and to the shift of peak potential to less positive values. These changes are dependent on the time of exposure and the concentration of methanol.

Coulometric detectors work with high conversion effectiveness and sensitivity, but in case of their passivation, reactivation is a relatively complicated problem, often leading to the replacement of electrode material. Answer to this problem can be given by using renewable electrochemical detectors. This type of reactivation is innovated during the development of new type of coulometric detector using potassium ferrocyanide and hydroquinone as model analytes. The conversion effectiveness for ferrocyanide is 90,1 % and for hydroquinone is 81,7 %. The response of detector is stable and its reproducibility is about 2 % for both analytes. Remaining deficiencies and improvements necessary for the practical applications are discussed.