

ABSTRACT:

The diploma thesis focuses on the range of the potential window of the BDD electrode in dependence on the composition of the mixed electrolyte solution and the treatment of the electrode surface. The measurements were performed on a polished (p-BDD) and O-terminated (O-BDD) electrode by the method of linear sweep voltammetry (LSV) in a three-electrode system. It was confirmed that in an environment with a suitable organic solvent, the range of the potential window widens. The measured solutions consisted of deionized water containing sodium perchlorate with a concentration of 1 mmol l⁻¹ and one organic solvent in which sodium perchlorate with a concentration of 1 mmol l⁻¹ was also dissolved. Acetonitrile, methanol, N,N-dimethylformamide and isopropanol were used in solutions (0 %, 1 %, 5 %, 10 %, 50 %, 70 %, 90 %, 95 %, 99 % or 100 % volume percent). Expansion, or the shortening of the potential window range was evaluated separately for each solvent in the anodic and cathodic regions. The expansion of the window on both sides was confirmed in acetonitrile as the concentration of the solvent increases, so it is based on this experiment as a universal solvent suitable for the determination of reducing and oxidizing analytes, from measurements on O-BDD and also on p-BDD. In the case of the remaining solvents, there was an expansion of the range only in the area of negative potentials, these environments are suitable for the determination of reducing substances. Furthermore, the results obtained from measurements on p-BDD and O-BDD were compared. The surface of O-BDD carries introduced more partially negatively charged oxygen groups compared to p-BDD, and when measured, there are larger shifts in the limit potential values on its film. In the last part, the benefit of bubbling solutions with nitrogen was confirmed by measuring p-BDD. A better course of the polarization curves was recorded after bubbling the solution in the cathodic region, in which oxygen dissolved mainly in organic solvents interferes from -500 mV.

KEYWORDS: boron doped diamond, electrochemistry, potential window, organic solvents, voltammetry