Electrochemical oxidation of glucose at nanoporous black gold surface in the presence of high concentration of chloride ions

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The electrochemical oxidation of glucose on nanoporous gold surfaces with high surface area was investigated in the absence and presence of Cl^-. We report on the fabrication of nanoporous black gold (NPBG) surfaces by one step anodization of gold in oxalic acid solutions. The porosity of the NPBG layers was controlled by changing the electrochemical parameters – step potential, step time– during the anodization process, and increase in the thickness of the NPBG layer is responsible for the enlargement of the electrochemical surface area (ESA). We have observed that the efficiency of surface utilization in the NPBG for glucose oxidation depending on the concentration of Cl^- has changed. The current density for glucose oxidation on NPBG surfaces does not increase linearly with ESA in the absence of Cl^-, whereas the current density for glucose increases more linearly with ESA in the high concentration of Cl^-. As a result, the application NPBG to the amperometric detection was demonstrated.