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Title: **Silver and gold nanostructures and surfaces modified with them in chemical analysis.**

Abstract

Gold and silver nanostructures possess unique physicochemical properties, especially optical, electrical and magnetic. As a result, nanostructures find a number of applications in various fields of science and technology. This thesis presents the use of gold and silver nanostructures in chemical analysis.

The literature part of this work presents selected issues about gold and silver nanostructures and their properties. Selected methods of synthesis and surface modification of nanostructures are discussed and conductive and non-conductive solid substrates modified with nanostructures are also described. Chemical sensors are demonstrated in which suspensions of nanostructures and solid substrates with immobilized metallic nanostructures are used.

This thesis presents synthesis methods of gold and silver nanostructures with various shapes and sizes and describes their optical properties. Part of the synthesized nanostructures were used to determine Hg^{2+} ions in water, using the dependence of the LSPR band position on the dielectric properties of the surrounding environment, shape and material of the nanostructure.

The surface modification of gold and silver nanostructures with appropriate ligands allowed their immobilization on solid substrates. To achieve this goal, a *click chemistry* reaction, the copper(I) azide-alkine cycloaddition, was used. For the first time, gold nanoparticles were attached to a glassy carbon electrode, where the Cu^{+} catalyst was generated both chemically and electrochemically. The modified surfaces were used as electrochemical or optical sensors.