„Fabrication of surfaces enhancing Raman signals"

Surface enhanced Raman spectroscopy (SERS) is one of the most rapidly growing techniques in the last decade, mostly due to the development in the field of nanotechnology. Thereby it became possible to design and fabricate SERS platforms with different shapes, properties and applications. In this dissertation an attempt was made to obtain SERS-active surfaces based on semiconductor nanostructures.

First chapter is dedicated to SERS platforms obtained on the basis of GaN nanowires. In the first attempt nanowires were covered with gold layer, which resulted in moderate surface enhancements. Nonetheless, when GaN whiskers were employed as a scaffold for gold microflowers, surfaces with excellent mechanical stability and high enhancements were produced.

The next chapter describes the preparation of the zinc oxide nanostructures with various morphologies. First, the SERS platforms based on the ZnO nanorods were prepared. When appropriate diameter and surface coverage of the nanorods was achieved, it resulted in obtaining “tent-like” structures. In order to improve surface morphology of the ZnO nanostructures, “pagoda-like” structures with highly developed surface were produced. All SERS platforms based on zinc oxide nanostructures were characterized by moderate surface enhancements.

Last chapter of the PhD thesis was devoted to deliberations on precise determination of the SERS substrates enhancement factor (SSEF) values. As a consequence the new method for SSEF determination was proposed. Due to the fact that all parameters of the equation were measured experimentally, the errors of the obtained enhancement factor values were minimal.