Imię i nazwisko autora rozprawy: **Martyna Marchelek**
Dyscyplina naukowa: Ochrona Środowiska
Tytuł rozprawy w języku polskim:
Kompozyty półprzewodnikowe: metody otrzymywania, charakterystyka i fotoaktywność
Tytuł rozprawy w języku angielskim:
Semiconductor composites: preparation methods, characterization and photocatalytic activity

Streszczenie w języku angielskim

This thesis presents experimental studies in the field of materials synthesis, properties of obtained photocatalysts and their photocatalytic activity in degradation processes in gaseous and aqueous phase. The main goal of the experimental part was to prepare stable in several cycles and photocatalytically active material under visible light range. The multicomponent materials i.e. semiconductor composites are more commonly used due to the possibility of wide band gap semiconductors utilization in the photocatalytic reaction under visible light range, because of the charge transfer from narrow band gap photocatalyst and the multiphoton excitation process.

My dissertation is composed of introduction to the subject area and discussion of the submitted publications (5 articles). In the introductory part, key information about heterogenic photocatalysis, the influence of the synthesis method on the properties and photocatalytic activity of semiconductors, and the most common preparation methods used for photoactive materials modifications. Part of the research work has been divided into two sections. Two articles were discussed in the section about the photocatalytic degradation in the gaseous phase. The first article concerned the materials based on potassium tantalate and their binary and ternary composites with WO_3, CdS, CdSe, MoS_2, $SrTiO_3$. The other publication describes several selected wide band gap semiconductors: TiO_2, $SrTiO_3$, $KTaO_3$ surface modified with platinum nanoparticles and cadmium tellurite quantum dots. All of these photocatalysts were examined in the model degradation reaction of toluene in gaseous phase. Further, the TiO_2/$SrTiO_3$ and $SrTiO_3$ were modified with various metal nanoparticles.
Moreover these photocatalysts were used to create the composites with bismuth consist semiconductors. To investigate the photocatalytic activity, the degradation of phenol in aqueous phase was used as a model reaction system.