

論文 / 著書情報
Article / Book Information

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Title(English)	Three-dimensional sea urchin-like TiO ₂ synthesized via ethylene glycol-assisted hydrothermal method: Its characteristics and solar photocatalytic activity
著者(和文)	CABRAL Kerry Pan
Author(English)	Kerry Pan Cabral
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Thesis Outline

Chapter 1: Introduction

This chapter provides a background on colored wastewater problem and the advantages of using advanced oxidation processes (AOPs), particularly TiO₂ photocatalysis, over the conventional treatment methods. Limitations and potential improvements of TiO₂ and its synthesis, and the objectives of the study are presented in this chapter.

Chapter 2: Literature Review

A thorough review of literatures regarding TiO₂ photocatalysis, recent developments in the design and applications of TiO₂ materials with different dimensionalities, various synthesis techniques of high-dimensional materials, and enhancement of photocatalytic activity by rare-earth metal doping is presented in this chapter.

Chapter 3: Synthesis of 3D Sea Urchin-like TiO₂ (SUT)

The facile synthesis procedure, which made use of ethylene glycol-assisted hydrothermal method, to produce TiO₂ with micrometer-sized 3D sea urchin-like structure is presented. The growth and formation mechanism of the TiO₂ structure was investigated by varying the hydrothermal reaction time. The roles of both sodium hydroxide and ethylene glycol were explained in detail in this chapter.

Chapter 4: Effect of Calcination Temperature on 3D SUT

The influence of calcination temperature on the characteristics and solar photocatalytic activity of the as-synthesized 3D SUT is elucidated, and the outcome of the sedimentation test using the best performing SUT sample in comparison with the commercially available TiO₂ is included in this chapter.

Chapter 5: Effect of Dopant Amount and Calcination Temperature on 3D Holmium-doped Sea Urchin-like TiO₂ (Ho-SUT)

The synthesis, characterization, and solar photocatalytic activity of Ho-SUT samples, together with the influences of dopant content and calcination temperature are discussed. The result of the sedimentation test using the best performing Ho-SUT sample compared with commercially available TiO₂ is presented in this chapter.

Chapter 6: General Conclusions

This chapter presents the general conclusions derived from this research.