

ห้องสมุดงานวิจัย สำนักงานคณะกรรมการวิจัยแห่งชาติ



E41069

CHARACTERIZATION OF TUNGSTEN OXIDE NANOSTRUCTURE
SYNTHESIZED BY HYDROTHERMAL METHOD

ORANUCH YAYAPAO

MASTER OF SCIENCE
IN CHEMISTRY

THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY

MARCH 2011

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**A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
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IN CHEMISTRY**

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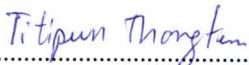
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TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS
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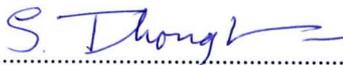
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6 March 2011

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Oranuch Yayapao

Thesis Title	Characterization of Tungsten Oxide Nanostructure Synthesized by Hydrothermal Method
Author	Miss Oranuch Yayapao
Degree	Master of Science (Chemistry)
Thesis Advisor	Assoc. Prof. Titipun Thongtem

Abstract

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Nano- and micro-structured WO_3 was successfully synthesized by hydrothermal reactions. Effect of acidity, reaction temperature and time on phase and morphologies of these products were discussed. The as-synthesized products were characterized by X-ray powder diffraction (XRD), Fourier transform infrared (FTIR) and Raman spectroscopy, and scanning and transmission electron microscopy (SEM, TEM), including UV-visible and photoluminescent (PL) spectroscopy. In this research, the products were pure orthorhombic and hexagonal WO_3 phases. Different morphologies such as microseeds, microflowers, nanoparticles, nanorods and nanowires were detected, controlled by acidity, reaction temperature and time.

ชื่อเรื่องวิทยานิพนธ์	การหาลักษณะเฉพาะของโครงสร้างนาโนทั้งสเดน ออกไซด์ที่สังเคราะห์โดยวิธีไฮโดรเทอร์มอล
ผู้เขียน	นางสาว อรนุช ยะยาเป้า
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บทคัดย่อ

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งานวิจัยครั้งนี้ได้สังเคราะห์ทั้งสเดนออกไซด์ที่มีโครงสร้างนาโนและไมโครโดยวิธีไฮโดรเทอร์มอลได้สำเร็จ โดยศึกษาผลของสารละลายกรด อุณหภูมิ และระยะเวลาการเกิดปฏิกิริยาต่อเฟส และมีสัญญาณวิทยาของผลผลิต จากนั้นหาลักษณะเฉพาะของผลิตภัณฑ์ที่สังเคราะห์ได้โดยวิธีต่างๆ เช่น เอกซ์เรย์ฟาวเดอรัลดิฟแฟรกชัน ฟลูออโรสเปกโตรสโกปีอินฟราเรด และรามานสเปกโตรสโกปี จุลทรรศน์อิเล็กตรอนแบบส่องกราดและส่องผ่าน รวมทั้ง ยูวี-วิสิเบิล และ โฟโตลูมิเนสเซนส์สเปกโตรสโกปี จากการวิเคราะห์ทราบว่า ผลิตภัณฑ์ที่ได้มีโครงสร้างผลึกแบบอโพรอมบิคและเฮกซะโกนอลของทั้งสเดนออกไซด์ที่บริสุทธิ์ โดยมีสัญญาณวิทยาของผลิตภัณฑ์ต่างกัน อาทิ เมล็ดไมโคร, ดอกไม้ไมโคร, อนุภาคนาโน, แท่งต้นนาโน และเส้นลวดนาโน ที่ควบคุมโดยสารละลายกรด อุณหภูมิ และระยะเวลาการเกิดปฏิกิริยา

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ABBREVIATIONS AND SYMBOLS

°C	=	Degree Celsius
eV	=	Electron Volt
g	=	Gram
h	=	Hour
ml	=	Milliliter
nm	=	Nanometer
μm	=	Micrometer
JCPDS	=	The Joint Committee for Powder Diffraction Standards
MW	=	Molecular Weight
FT-IR	=	Fourier-Transform Infrared Spectrometer
PL	=	Photoluminescence Spectrometer
SEM	=	Scanning Electron Microscope
TEM	=	Transmission Electron Microscope
XRD	=	X-ray Diffraction Spectrometer