

**SYNTHESIS AND CHARACTERIZATION OF GOLD-DOPED OXIDE
CATALYSTS**

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for the Degree of Master of Science
The Petroleum and Petrochemical College, Chulalongkorn University
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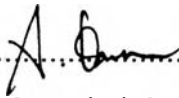
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ABSTRACT

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In this study, a series of gold catalysts deposited on various types of supports (NiO, MnO₂, and Y₂O₃) was prepared by coprecipitation and deposition-precipitation methods at different calcination temperatures and metal loadings. It was found that the BET surface area of the catalysts prepared was dependent on calcination temperature and metal loading for Au/NiO while these effects were insignificant for Au/MnO₂. Gold particles and NiO crystals were larger in size when the catalysts were calcined at a higher temperature. There was no change in the morphology of Au/MnO₂ but the structure of Au/Y₂O₃ changed when the catalysts were calcined at 500°C since transformation from yttrium precursor to Y₂O₃ was almost completely occurred as calcination temperature increased to 500°C. In addition, for Au/NiO calcined at 400°C, desorption of oxygen appeared at the lowest temperature. The active sites of Au/MnO₂ were apparently modified when calcination temperature increased to 500°C. Furthermore, the addition of Au on Y₂O₃ did not enhanced the adsorption and desorption properties of oxygen and it also reduced the BET surface area.

บทคัดย่อ

อภิวัดน์ รัตนชาติชัย : การสังเคราะห์และการตรวจสอบคุณลักษณะตัวเร่งปฏิกิริยาโลหะออกไซด์ที่เติมทอง (Synthesis and Characterization of Gold-Doped Oxide Catalysts) อ. ที่ปรึกษา : ศาสตราจารย์ โยฮันเนส ชเวงค์ และ รองศาสตราจารย์ สุเมธ ชวเดช 63 หน้า ISBN 974-334-118-8

ในการศึกษานี้ ตัวเร่งปฏิกิริยาทองในปริมาณต่างๆถูกเตรียมบนฐานชนิดต่างๆ (นิกเกิลออกไซด์ แมงกานีสไดออกไซด์ และ อิทเทรียมออกไซด์) โดยวิธีการคกตะกอนร่วมและวิธีการคกตะกอนแบบเกาะ ที่อุณหภูมิเผาต่างๆและที่ปริมาณโลหะต่างๆ จากการศึกษาพบว่าพื้นที่ผิวของตัวเร่งปฏิกิริยาทองที่ยึดเกาะบนฐานนิกเกิลออกไซด์ขึ้นอยู่กับอุณหภูมิที่ใช้ในการเผาและปริมาณทองที่เติม ในขณะที่พื้นที่ผิวของตัวเร่งปฏิกิริยาทองที่ยึดเกาะบนแมงกานีสไดออกไซด์ได้รับผลกระทบค่อนข้างน้อย เมื่ออุณหภูมิที่ใช้ในการเผาสูงขึ้น ขนาดผลึกของทองและนิกเกิลออกไซด์มีขนาดใหญ่ขึ้นด้วย แต่แทบจะไม่มีเปลี่ยนแปลงสำหรับตัวเร่งปฏิกิริยาทองที่เกาะบนแมงกานีสไดออกไซด์ ส่วนการเปลี่ยนรูปจากสารตั้งต้นของอิตเทรียมไปเป็นตัวเร่งปฏิกิริยาทองบนฐานอิตเทรียมออกไซด์เกิดขึ้นอย่างสมบูรณ์เมื่ออุณหภูมิที่ใช้ในการเผาสูงขึ้นถึง 500 องศาเซลเซียส นอกจากนี้คุณลักษณะการคายก๊าซออกซิเจนสำหรับตัวเร่งปฏิกิริยาทองบนฐานนิกเกิลออกไซด์ที่ถูกเผาที่ 400 องศาเซลเซียสจะมีค่าต่ำที่สุด บริเวณที่วงไวต่อปฏิกิริยาของตัวเร่งปฏิกิริยาทองบนฐานแมงกานีสไดออกไซด์ที่ถูกเผาที่อุณหภูมิ 500 องศาเซลเซียสถูกเปลี่ยนแปลงอย่างชัดเจน นอกจากนี้การเติมทองบนฐานอิตเทรียมออกไซด์ไม่ได้ช่วยให้เกิดการดูดซับและการคายก๊าซออกซิเจนและยังทำให้พื้นที่ผิวลดลงอีกด้วย

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