

**PREFERENTIAL CARBON MONOXIDE OXIDATION (PROX) OVER  
Au-BASED CATALYST**

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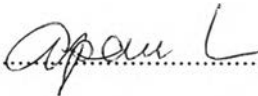
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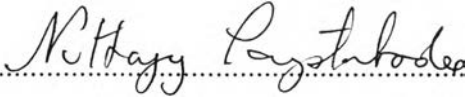
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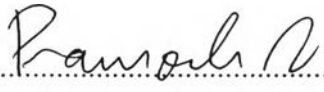
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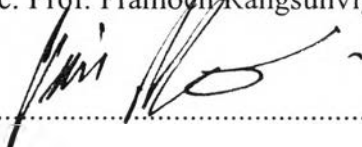
  
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## ABSTRACT

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Sasiporn Chayaporn: Preferential Carbon Monoxide Oxidation (PROX) over Au-based Catalyst.

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Keywords: Fuel cell/ CO conversion/ CO selectivity/ Au catalyst/ Ceria/ Zirconia/ PROX/ CO oxidation

Preferential CO oxidation (PROX) is the most effective method for removal of CO from the reformat stream. Catalytic activity of Au/CeO<sub>2</sub>-ZrO<sub>2</sub> with various atomic ratios of Ce/(Ce+Zr) (0, 0.25, 0.5, 0.75, and 1), prepared by the deposition-precipitation method, was investigated in a reformat gas mixture (1% CO, 1% O<sub>2</sub>, 40% H<sub>2</sub>, and He) at 50 °C to 190 °C. Catalytic activity depended on the Ce/(Ce+Zr) atomic ratio. Maximum CO conversion of 94.06% was obtained for 1 wt% Au/Ce<sub>0.75</sub>Zr<sub>0.25</sub>O<sub>2</sub> at 50 °C. The effect of H<sub>2</sub>O in the H<sub>2</sub>-feed stream was also investigated. The presence of H<sub>2</sub>O had no significant effect on activity. In the stability test, the activity of both 1 wt% Au/CeO<sub>2</sub> and 1 wt% Au/Ce<sub>0.75</sub>Zr<sub>0.25</sub>O<sub>2</sub> catalysts were maintained in the simulated dry condition at 110 °C for 28 h.

## บทคัดย่อ

ศศิพร ชยาภรณ์ : การเกิดปฏิกิริยาออกซิเดชันแบบเลือกเกิดของคาร์บอนมอนอกไซด์บนตัวเร่งปฏิกิริยาทอง (Preferential Carbon Monoxide Oxidation (PROX) over Au-based Catalyst) อ. ที่ปรึกษา : รศ. ดร.อาภาณี เหลืองนฤมิตชัย และรศ. ดร. ณัฐชยาน์ พงศ์สถาปดี 89 หน้า

การเลือกเกิดปฏิกิริยาออกซิเดชันของก๊าซคาร์บอนมอนอกไซด์เป็นวิธีที่มีประสิทธิภาพในการลดปริมาณคาร์บอนมอนอกไซด์ที่เกิดจากแก๊สสังเคราะห์ ซึ่งในงานวิจัยนี้ศึกษาตัวเร่งปฏิกิริยาทองบนตัวรองรับผสมระหว่างซีเรียออกไซด์และเซอร์โคเนียออกไซด์ที่อัตราส่วนอะตอมของซีเรียและเซอร์โคเนีย (0:1, 1:3, 1:1, 3:1, และ 1:0) ที่เตรียมด้วยวิธีการยัดเกาะควบคู่กับการตกผลึก (Deposition-precipitation) โดยก๊าซที่ป้อนเข้าสู่ปฏิกิริยาประกอบด้วยก๊าซคาร์บอนมอนอกไซด์ร้อยละ 1 ก๊าซออกซิเจนร้อยละ 1 ก๊าซไฮโดรเจนร้อยละ 40 และปรับสมดุลโดยก๊าซฮีเลียมที่ช่วงอุณหภูมิ 50 องศาเซลเซียส ถึง 190 องศาเซลเซียส จากการศึกษาพบว่าความสามารถของตัวเร่งปฏิกิริยาขึ้นกับสัดส่วนของตัวรองรับผสม โดยตัวเร่งปฏิกิริยา 1 wt% Au/Ce<sub>0.75</sub>Zr<sub>0.25</sub>O<sub>2</sub> ให้ค่าการเปลี่ยนแปลงของก๊าซคาร์บอนมอนอกไซด์ที่สูงที่สุดคือ 94.06 เปอร์เซ็นต์ ที่อุณหภูมิ 50 องศาเซลเซียส นอกจากนี้ยังศึกษาผลของน้ำที่มีในก๊าซไฮโดรเจน โดยพบว่าน้ำไม่มีผลต่อความว่องไวของการเกิดปฏิกิริยา และเมื่อนำไปทดสอบความเสถียรของปฏิกิริยาพบว่าตัวเร่งปฏิกิริยา 1 wt% Au/CeO<sub>2</sub> และ 1 wt% Au/Ce<sub>0.75</sub>Zr<sub>0.25</sub>O<sub>2</sub> มีความเสถียรในการเกิดปฏิกิริยาที่สภาวะแก๊สสังเคราะห์ที่อุณหภูมิ 110 องศาเซลเซียส เป็นเวลา 28 ชั่วโมง

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