#### **REFERENCES**

- Ahluwalia, R.K., Zhang, Q., Chmielewski, D.J., Lauzze, K.C., and Inbody, M.A. (2005) Performance of CO preferential oxidation reactor with noble–metal catalyst coated on ceramic monolith for on–board fuel processing applications. <u>Catalysis Today</u>, 99(3–4), 271–283.
- Ahmed, S., Doshi, R., Kumar, R., and Krumpelt, M. (1997) Gasoline to hydrogen A new route for fuel cell. <u>Electric Hybrid Vehicle Technology</u>, 97, 77–80.
- Avgouropoulos, G., Ioannides, T., Papadopoulou, C., Batista, J., Hocevar S., and Matralis, H.K., (2002) A comparative study of Pt/γ–Al<sub>2</sub>O<sub>3</sub>, Au/α–Fe<sub>2</sub>O<sub>3</sub> and CuO–CeO<sub>2</sub> catalysts for selective oxidation of carbon monoxide in excess hydrogen. Catalysis Today, 75(1–4), 157–167.
- Avgouropoulos, G., Papavasiliou, J., Tabakova, T., Idakiev, V., and Ioannides, T. (2006) A comparative study of ceria-supported gold and copper oxide catalysts for preferential CO oxidation reaction. Chemical Engineering <u>Journal</u>, 124(1-3), 41-45.
- Chang, L.H., Yeh, Y.L., and Chen, Y.W. (2008) Preferential oxidation of CO in hydrogen stream over nano-gold catalysts prepared by photodeposition method. International Journal of Hydrogen Energy, 33(7), 1965–1974.
- Fogler, H.S. (1999) Elements of chemical reaction engineering. Prentice Hall International Series in the Physical and Chemical Engineering Sciences: N.R. Amundson, 3<sup>rd</sup> Edition.
- Haruta, M., Tsubota, S., Kobayashi, T., Kageyama, H., Genet, M. J., and Delmon, B.
   (1993) Low-Temperature Oxidation of CO over Gold Supported on TiO<sub>2</sub>,
   α-Fe<sub>2</sub>O<sub>3</sub> and Co<sub>3</sub>O<sub>4</sub>. <u>Journal of Catalysis</u>, 144(1), 175–192.
- Igarashi, H., Uchida, H., Suzuki, M., Sasaki, Y., and Watanabe, M. (1997) Removal of carbon monoxide from hydrogen-rich fuels by selective oxidation over platinum catalyst supported on zeolite. <u>Applied Catalysis A: General</u>, 159(1-2), 159-169.
- Iwasa, N., Arai, S., and Arai, M. (2006) Effect of Cs promoter on the activity of Pd/ZnO catalyst for selective oxidation of CO in H<sub>2</sub>-rich gas. <u>Catalysis Communications</u>, 7(11), 839–842.

- Kahlich, M.J., Gasteiger, H.A., and Behm, R.J. (1999) Kinetics of the Selective Low-Temperature Oxidation of CO in H<sub>2</sub>-Rich Gas over Au/α-Fe<sub>2</sub>O<sub>3</sub>.

  <u>Journal of Catalysis</u>, 182(2), 430-440.
- Kandoi, S., Gokhale, A.A., Grabow, L.C., Dumesic, J.A., and Mavrikakis, M. (2004) Why Au and Cu are more selective than Pt for preferential oxidation of CO at low temperature. <u>Catalysis Letters</u>, 93(1–2), 93–100.
- Li, D., Shishido, T., Oumi, Y., Sano, T., and Takehira, K. (2007) Self–activation and self–regenerative activity of trace Rh–doped Ni/Mg(Al)O catalysts in steam reforming of methane <u>Applied Catalysis A: General</u>, 332(1), 98–109.
- Lindström, B., and Pettersson, L. J. (2002) Steam reforming of methanol over copper–based monoliths: the effects of zirconia doping. <u>Journal of Power Sources</u>, 106(1–2), 264–273.
- Liu, X., Korotkikh, O., and Farrauto, R. (2002) Selective catalytic oxidation of CO in H<sub>2</sub>: structural study of Fe oxide-promoted Pt/alumina catalyst. <u>Applied Catalysis A: General</u>, 226(1-2), 293-303.
  - Luengnaruemitchai, A., Osuwan, S., and Gulari, E. (2004) Selective catalytic oxidation of CO in the presence of H<sub>2</sub> over gold catalyst. <u>International Journal of Hydrogen Energy</u>, 29(4), 429–435.
  - Manzoli, M., Chiorino, A., and Boccuzzi, F. (2004) Decomposition and combined reforming of methanol to hydrogen: a FTIR and QMS study on Cu and Au catalysts supported on ZnO and TiO<sub>2</sub>. <u>Applied Catalysis B: Environmental</u>, 57(3), 201–209.
  - Naknam, P., Luengnaruemitchai, A., Wongkasemjit, S., and Osuwan, S. (2007)

    Preferential catalytic oxidation of carbon monoxide in presence of hydrogen over bimetallic AuPt supported on zeolite catalysts.

    Journal of Power Sources, 165(1), 353–358.
  - Oetjen, H.F., Schmidt, V.M., Stimming, U., and Trila, F. (1996) Performance data of a proton exchange membrane fuel cell using H<sub>2</sub>/CO as fuel gas. <u>Journal of the Electrochemical Society</u>, 143(12), 3838–3842.
  - Rossignol, C., Arrii, S., Morfin, F., Piccolo, L., Caps, V., and Rousset, J. (2005) Selective oxidation of CO over model gold–based catalysts in the presence of H<sub>2</sub>. <u>Journal of Catalysis</u>, 230(2), 476–483.

- Rosso, I., Galletti, C., Saracco, G., Garrone, E., and Specchia, V. (2004)

  Development of A zeolites-supported noble-metal catalysts for CO

  preferential oxidation: H<sub>2</sub> gas purification for fuel cell. <u>Applied Catalysis B:</u>

  <u>Environmental</u>, 48(3), 195–203.
- Schubert, M.M., Hackenberg, S., Veen, A.C.V., Muhler, M., Plzak, V., and Behm R.J. (2001) CO Oxidation over Supported Gold Catalysts—"Inert" and "Active" Support Materials and Their Role for the Oxygen Supply during Reaction. <u>Journal of Catalysis</u>, 197(1), 113–122.
- Schubert, M.M., Kahlich, M.J., Gasteiger, H.A., and Behm, R.J. (1999) Correlation between CO surface coverage and selectivity/kinetics for the preferential CO oxidation over Pt/γ-Al<sub>2</sub>O<sub>3</sub> and Au/α-Fe<sub>2</sub>O<sub>3</sub>: an in-situ DRIFTS study. Journal of Power Sources, 84(2), 175–182.
- Seo, Y.T., Seo D.J., Jeong, J.H., and Yoon, W.L. (2006) Design of an integrated fuel processor for residential PEMFCs applications. <u>Journal of Power Sources</u>, 160(1), 505–509.
- Shou, M., Tanaka K., Yoshioka, K., Moro-oka, Y., and Nagano, S. (2004) New catalyst for selective oxidation of CO in excess H<sub>2</sub> designing of the active catalyst having different optimum temperature. <u>Catalysis Today</u>, 90(3-4), 255-261.
- Srinivas, S. and Gulari, E. (2006) Preferential CO oxidation in a two-stage packed-bed reactor: Optimization of oxygen split ratio and evaluation of system robustness. <u>Catalysis Communications</u>, 7(10) 819–826.
- Thomas, C.E., James, B.D., LomaxJr, F.D., and KuhnJr, I.F. (2000) Fuel options for the fuel cell vehicle: hydrogen, methanol or gasoline? <u>International Journal of Hydrogen Energy</u>, 25(6), 551–567.
- Twigg, M.V., Lywood, W.J., Lloyd, J., and Rider, D.E. (1989) <u>Catalyst Handbook</u>, Wolfe Publishing, London.
- Wang, Y.H., Zhu, J.L., Zhang, J.C., Song, L.F., Hu, J.Y., Ong, S.L., and Ng, W.J. (2006) Selective oxidation of CO in hydrogen-rich mixtures and kinetics investigation on platinum-gold supported on zinc oxide catalyst. <u>Journal of Power Sources</u>, 155(2), 440-446.

- Watanabe, M., Uchida, H., Ohkubo, K., and Igarashi, I. (2003) Hydrogen purification for fuel cells: selective oxidation of carbon monoxide on Pt–Fe/zeolite catalysts. Applied Catalysis B: Environmental, 46(3), 595–600.
- Xu, H., Shi, K., Shang, Y., Zhang, Y., Xu, G., and Wei, Y. (1999) A study on the reforming of natural gas with steam, oxygen and carbon dioxide to produce syngas for methanol feedstock. <u>Journal of Molecular Catalysis A:</u>
  <u>Chemical</u>, 147(1-2), 41-46.
- Zhang, J., Wang, Y., Chen, B., Li, C., Wu, D., and Wang, X. (2003) Selective oxidation of CO in hydrogen rich gas over platinum-gold catalyst supported on zinc oxide for potential application in fuel cell. Energy Conversion and Management, 44(11), 1805–1815.
- Zhao, Z., Yung, M.M., and Ozkan, U.S. (2008) Effect of support on the preferential oxidation of CO over cobalt catalysts. <u>Catalysis Communications</u>, 9(6), 1465–1471.

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- 2. Luengnaruemitchai, A., Nimsuk, M., **Naknam, P.**, Wongkasemjit, S., and Osuwan, S., A Comparative Study of Synthesized and Commercial A-type Zeolite-Supported Pt Catalysts for Selective CO Oxidation in H<sub>2</sub>-rich Stream. Int. J. Hydrogen Energy, 33 (2008) 206–213.
- 3. Luengnaruemitchai, A., **Naknam, P.**, and Wongkasemjit, S., Investigation of Double-Stage Preferential CO Oxidation Reactor over Bimetallic Au–Pt Supported on A-Zeolite Catalyst. Ind. Eng. Chem. Res., 47 (2008) 8160–8165.
- 4. **Naknam**, **P.**, Luengnaruemitchai, A., and Wongkasemjit, S., Au/ZnO and Au/ZnO-Fe<sub>2</sub>O<sub>3</sub> Prepared by Deposition–Precipitation and Their Activity in the Preferential Oxidation of CO. Energy Fuels, 23 (2009) 5084–5091.



- 5. **Naknam, P.**, Luengnaruemitchai, A., and Wongkasemjit, S., Preferential CO Oxidation over Au/ZnO and Au/ZnO-Fe<sub>2</sub>O<sub>3</sub> Catalysts Prepared by Photodeposition. Int. J. Hydrogen Energy, 34 (2009) 9838-9846.
- 6. **Naknam**, **P.**, Luengnaruemitchai, A., and Wongkasemjit, S., Preferential CO Oxidation over Au/ZnO-Fe<sub>2</sub>O<sub>3</sub> in an Integrated System for H<sub>2</sub> Fuel Production. In preparation.

## **Proceedings:**

- Naknam, P., Luengnaruemitchai, A., and Wongkasemjit, S. (2005, November 30–December 2) Preferential Oxidation of CO in the Presence of H<sub>2</sub> over Au Supported on Zeolite Catalysts. <u>Proceedings of the Regional Symposium on Chemical Engineering 2005 (RSCE 2005)</u>, Hanoi, Vietnam.
- Naknam, P., Luengnaruemitchai, A., and Wongkasemjit, S. (2006, December 6–8) Influences of CO<sub>2</sub> and H<sub>2</sub>O on Preferential CO Oxidation in Excess Hydrogen over Pt/A-zeolite and PtAu/A-zeolite Catalysts.
   Proceedings of the 4th Asia Pacific Congress on Catalysis (APCAT 4), Singapore.
- 3. **Naknam, P.**, Luengnaruemitchai, A., and Wongkasemjit, S. (2007, May 23–25) Development of Preferential Catalytic CO Oxidation Reaction Process in the Presence of H<sub>2</sub> by Using Double Catalytic Reactor. Proceeding of the 3<sup>rd</sup> Energy Network Conference of Thailand, Bangkok, Thailand.
- 4. **Naknam, P.**, Wongkasemjit, S. and Luengnaruemitchai, A. (2008, July 20–22) The CO Removal in H<sub>2</sub>-rich Stream over Au Nanoparticles Supported on ZnO and ZnO-Fe<sub>2</sub>O<sub>3</sub> Catalysts. <u>Proceeding of the Catalysis for Hydrogen Energy Production and Utilization</u>, Gyeongju, Korea.
- 5. **Naknam**, **P.**, Luengnaruemitchai, A., and Wongkasemjit, S. (2008, August 19–20) Effect of CO<sub>2</sub> and H<sub>2</sub>O on the PROX of CO over

- Supported Au Catalyst. <u>Proceeding of Thai-Japan Joint Symposium on Advances in Materials and Environmental Technology</u>, Bangkok, Thailand.
- 6. **Naknam, P.**, Luengnaruemitchai, A., and Wongkasemjit, S. (2009, April 29–May 1) Development of Preferential CO Oxidation in an Integrated System for H<sub>2</sub> Fuel Production. <u>Proceeding of the 5<sup>th</sup> Energy Network Conference of Thailand</u>, Phitsanulok, Thailand.

## **Presentations:**

- 1. **Naknam, P.**, Luengnaruemitchai, A., and Wongkasemjit, S. A Comparative Study of the Bimetallic AuPt/A zeolite Catalyst in the Single-Stage and the Two-Stage Reactor for the PROX Reaction. (2007, July 16–20) Paper presented at <u>International Symposium on Relations between Homogenous and Heterogeneous Catalysis</u>, Berkeley, California, USA.
- 2. Naknam, P., Luengnaruemitchai, A., and Wongkasemjit, S. The Application of Au-Pt Supported on A Zeolite with the Double Stage Catalytic Reactor in the PROX Unit. (2007, July 23–28) Paper presented at <u>Summer School on Nanomaterial</u>, National Institute for Material Science, Tsukuba, Japan.