#### REFERENCES

- Aita, Y., Komatsu, M., Yin, S., and Sato, T. (2004). Phase-compositional control and visible light photocatalytic activity of nitrogen-doped titania via solvothermal process, <u>Journal of Solid State Chemistry</u>, 177, 3235-3238.
- Anderson, C. and Bard, A.J. (1997). Improved photocatalytic activity and characterization of mixed TiO<sub>2</sub>/SiO<sub>2</sub> and TiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> materials. <u>Journal of</u> <u>Physical Chemistry</u>, 101, 2611-2616.
- Andrulevicius, M., Tamulevicius, S., Gnatyuk, Y., Vityuk, N., Smirnova, N,. and Eremenko, A. (2007). XPS investigation of TiO<sub>2</sub>/ZrO<sub>2</sub>/SiO<sub>2</sub> films modified with Ag/Au nanoparticles. <u>Materials Science</u>, 14, 8-14.
- Archer, M.D. and Bolton, J.R. (1990). Requirements for ideal performance of photochemical and photovoltaic solar energy converters. <u>Journal of</u> <u>Physical Chemistry</u>, 94, 8028-8036.
- Asahi, R., Morikawa, T., Ohwaki, T., Aoki, K., and Taga, Y. (2001). Visible-light photocatalysis in nitrogen-doped titanium oxides. Science, 293, 269-271.
- Bak, T., Nowotny, J., Rekas, M., and Sorrell, C.C. (2002). Photo-electrochemical hydrogen generation from water using solar energy. <u>International Journal</u> <u>of Hydrogen Energy</u>, 27, 991-1022.
- Bamwenda, G.R., Tsubota, S., Nakamura, T., and Haruta, M. (1995). Photoassisted hydrogen production from a water-ethanol solution: a comparison of activities of Au-TiO<sub>2</sub> and Pt-TiO<sub>2</sub>. <u>Journal of Photochemistry and Photobiology A: Chemistry</u>, 89, 177-189.
- Bard, A.J. and Fox, M.A. (1995). Artificial photosynthesis: solar splitting of water to hydrogen and oxygen. <u>Accounts of Chemical Research</u>, 28, 141-145.
- Bethany, J.A., Lang, H., and Chandler, B.D. (2007). Dendrimer templates for heterogeneous catalysts: Bimetallic Pt-Au nanoparticles on oxide supports. <u>Applied</u> Catalysis B: Environmental, 81 (2008) 225-235.
- Bi, Z.C. and Tien, H.T. (1984). Photoproduction of hydrogen by dye-sensitized systems. International Journal of Hydrogen Energy, 9(8), 717-722.
- Carp, O., Huisman, C.L., and Reller, A. (2004). Photoinduced reactivity of titanium dioxide. <u>Progress in Solid State Chemistry</u>, 32, 33-177.

- Chen, X.B. and Mao, S.S. (2007). Titanium dioxide nanomaterials: synthesis, properties, modifications, and applications. <u>Chemical Reviews</u>, 107, 2891-2959.
- Cullity, B.D. (1978). <u>Elements of X-ray diffraction</u>. Reading, MA: Addison-Wesley Plubication Company.
- Deng, X., Yue, Y., and Gao, Z. (2002). Gas phase photo-oxidation of organic compounds over nanosized TiO<sub>2</sub> photocatalysts by various preparations. <u>Applied Catalysis B: Environmental</u>, 39, 135-147.
- Dhanalakshmi, K.B., Latha, S., Anandan, S., and Maruthamuthu, P. (2000). Dye sensitized hydrogen evolution from water. <u>International Journal of</u> <u>Hydrogen Energy</u>, 26, 669-674.
- Ding, X. and Liu, X. (1998). Correlation between anatase-to-rutile transformation and grain growth in nanocrystalline titania. <u>Journal of Materials Research</u>, 13, 2556-2559.
- Doong, R.A., Chen, C.H., Maithreepala, R.A., and Chang, S.M. (2001). The influence of pH and cadmium sulfide on the photocatalytic degradation of 2-chlorophenol in titanium dioxide suspensions. <u>Water Research</u>, 35(12), 2873-2880.
- Fu, X.Z., Zeltner, W.A., and Anderson, M.A. (1995). The gas-phase photocatalytic mineralization benzene on porous titania-based catalysts. <u>Applied Catalysis</u> <u>B</u>, 6, 209-224.
- Fujishima, A. and Honda, K. (1972). Electrochemical photolysis of water at a semiconductor electrode. <u>Nature</u>, 238, 37-38.
- Fujishima, A., Rao, T.N., and Tryk, D.A. (2000). Titanium dioxide photocatalysis. Journal of Photochemistry and Photobiology C: Photochemistry Reviews, 1, 1-21.
- Gao, X. and Wachs, I.E. (1999). Titania-silica as catalysts: molecular structural characteristics and physico-chemical properties. <u>Catalysis Today</u>, 51, 233-254.

- Gurunathan, K., Maruthamuthu, P., and Sastri, V.C. (1997). Photocatalyst hydrogen production by dye-sensitized Pt/SnO<sub>2</sub> and Pt/SnO<sub>2</sub>/RuO<sub>2</sub> in aqueous methyl viologen solution. <u>International Journal of Hydrogen Energy</u>, 207(1-2), 173-181.
- Hague, D.C. and Mayo, M.J. (1994). Controlling crystallinity during processing of nanocrystalline titania. <u>Journal of the American Ceramic Society</u>, 77, 1957-1960.
- Hoffmann, M.R., Martin, S.T., Choi, W., and Bahnemann, D.W. (1995). Environmental applications of semiconductor photocatalysis. <u>Chemical</u> <u>Reviews</u>, 95, 69-96.
- Inagaki, M., Nakazawa, Y., Hirano, M., Kobayashi, Y., Toyoda, M. (2001). Preparation of stable anatase-type TiO<sub>2</sub> and its photocatalytic performance, <u>International Journal of Inorganic Materials</u> 3 (2001) 809-811.
- Ishizaki, K., Komarneni, S., and Nanko, M. (1988). <u>Porous Materials Process</u> <u>Technology and Applications</u>, Kluwer Academic Publisher, London.
- Jung, K.Y. and Park, S.B. (2004). Photoactivity of SiO<sub>2</sub>/TiO<sub>2</sub> and ZrO<sub>2</sub>/TiO<sub>2</sub> mixed oxides prepared by sol-gel method. <u>Materials Letters</u> 58 (2004) 2897-2900.
- Kamat, P.V. (1995). Tailoring Nanostructured Thin Films, Chemtech.
- Kang, M.G., Han, H.E., and Kim, K.J. (1999). Enhance photodecomposition of 4chlorophenol in aqueous solution by deposition of CdS on TiO<sub>2</sub> <u>Journal of</u> <u>Photochemistry and Photobiology A: Chemistry</u>, 124, 119-125.
- Kobasa, I.M., Kondratyeva, I.V., and Vorobets, G.I. (2008). TiO<sub>2</sub>-Me<sub>n</sub>O<sub>m</sub>-based materials. <u>Superlattices and Microstructures</u>, 44, 496-505.
- Li, D., Haneda, H., Ohashi, N., Hishita, S., and Yoshikawa, Y. (2004). Synthesis of nanosized nitrogen-containing MO<sub>X</sub>-ZnO (M=W,V,Fe) composite powders by spray pyrolysis and their visible-light-driven photocatalysis in gas phase acetaldehyde decomposition. <u>Catalysis Today</u>, 93-95, 895-901.
- Li, X., Li, B., Cheng, M., Du, Y., Wang, X., and Yang, P. (2007). Catalytic hydrogenation of phenyl aldehydes using bimetallic Pt/Pd and Pt/Au nanoparticles stabilized by cubic silsesquioxanes. <u>Journal of Molecular</u> <u>Catalysis A: Chemical</u> 284 (2008) 1-7.

- Lin, Y.S., Chang, C.H., and Gopalan, R. (1994). Improvement of thermal stability of porous nanostructured ceramic membranes. <u>Industrial & Engineering</u> <u>Chemistry Research</u>, 33, 860-870.
- Matsuoka, M., Kitano, M., Takeuchi, M., Tsujimaru, K., Anpo, M., and Thomas, J.M. (2007). Photocatalysis for new energy production Recent advances in photocatalytic water splitting reaction for hydrogen production. <u>Catalysis</u> <u>Today</u>, 122, 51-61.
- Mills, A., Lee, S.K., and Lepre, A. (2003). Photodecomposition of ozone sensitised by a film of titanium dioxide on glass. <u>Journal of Photochemistry and</u> <u>Photobiology A: Chemistry</u>, 155, 199-205.
- Mrowetz, M., Balcerski, W., Colussi, A.J., and Hoffmann, M.R. (2004). Oxidative power of nitrogen-doped TiO<sub>2</sub> photocatalysts under visible illumination. Journal of Physical Chemistry B, 108, 17269-17273.
- Mugglie, D.S. and Ding, L. (2001). Photocatalytic performance of sulfated TiO<sub>2</sub> and Degussa P-25 TiO<sub>2</sub> during oxidation of organics. <u>Applied Catalysis B:</u> <u>Environmental</u>, 32, 181-188.
- Nada, A.A., Barakat, M.H., Hamed, H.A., Mohamed, N.R., and Veziroglu. T.N. (2005). Studies on photocatalytic hydrogen production using suspended modified TiO<sub>2</sub> photocatalysts. <u>International Journal of Hydrogen Energy</u>, 30, 687-691.
- Nguyen, T.V., Kim, S., and Yang, O.B. (2003). Water decomposition on TiO<sub>2</sub>-SiO<sub>2</sub> and RuS<sub>2</sub>/TiO<sub>2</sub>-SiO<sub>2</sub> photocatalysts: the effect of electronic characteristics. <u>Catalysis Communications</u>, 5, 59-62.
- Ni, M., Leung, M.K.H., Leung, D.Y.C. and Sumathy, K. (2005). A review and recent developments in photocatalytic water-splitting using TiO<sub>2</sub> for hydrogen production. <u>Renewable and Sustainable Energy Reviews</u>, 11, 401-425.
- Ohno, T., Akiyoshi, M., Umebayashi, T., Asai, K., Mitsui, T., and Matsumura, M. (2004). Preparation of S-doped TiO<sub>2</sub> photocatalysts and their photocatalytic activities under visible light. <u>Applied Catalysis A: General</u>, 265, 115-121.

- Ollis, D.F. and Al-Ekabi, H. (1993). <u>Photocatalytic Purification and Treatment of</u> <u>Water and Air</u>, Elsevier, Amsterdam.
- Puangpetch, T., Sreethawong, T., Yoshikawa, S., and Chavadej, S. (2008). Synthesis and photocatalytic activity in methyl orange degradation of mesoporous-assembled SrTiO<sub>3</sub> nanocrystals prepared by sol-gel method with the aid of structure-directing surfactant. Journal of Molecular Catalysis <u>A: Chemical</u>, 287, 68-77.
- Peng, S.Q., Li, Y.X., Jiang, F.Y., Lu, G.X., and Li, S.B. (2004). Effect of Be<sub>2</sub>C doping TiO<sub>2</sub> on its photocatalytic activity. <u>Chemical Physics Letters</u>, 398(1-3), 235-239.
- Rajeshwar, K. (1995). Photoelectrochemistry and the environmeant. Journal of Applied Electrochemistry, 25, 1067-1082.
- Reddy, B.M. and Khan, A. (2005). Recent advances on TiO<sub>2</sub>-ZrO<sub>2</sub> mixed oxides as catalysts and catalyst supports. <u>Catalysis Reviews</u>, 47, 257-296.
- Rouquerol, F., Rouquerol, J., and Sing, K. (1999). <u>Adsorption by Powders and</u> <u>Porous Solid: Principle, Methodology and Applications</u>, Academic Press, San Diego.
- Sakthivel, S., Shankar, M.V., Palanichamy, M., Arabindoo, B., Bahnemann, D.W., and Murugesan, V. (2004). Enhancement of photocatalytic activity by metal deposition: characterization and photonic efficiency of Pt, Au and Pd deposited on TiO<sub>2</sub> catalyst. <u>Water Research</u>, 38, 3001-3008.
- Savage, N., Chwieroth, B., Ginwalla, A., Patton, B.R., and Dutta, P.K. (2001). Composite n-p semiconducting titanium oxides as gas sensor. <u>Sensors and Actuators B: Chemical</u>, 79, 17-27.
- Schattka, J.H., Shcukin, D.G., Jia, J., Antonietti, M., and Caruso, R.A. (2002).
  Photocatalytic Activities of Porous Titania and Titania/Zircronia Structures
  Formd by Using a Polymer Gel Templating Tecnique. <u>Chemistry of</u>
  <u>Materials</u>, 14, 5103-5108.
- Serpone, N. and Pelizzetti, E. (1989). <u>Photocatalysis: Fundamentals and</u> <u>Applications</u>, Wiley, New York.
- Smith, J.V., Editor. (1960). X-ray Powder Data File, American Society for Testing Materials.

- So, W.W., Kim, K.J., and Moon, S.J. (2004). Photo-production of hydrogen over the CdS-TiO<sub>2</sub> nano-composite particulate films treated with TiCl<sub>4</sub>. <u>International Journal of Hydrogen Energy</u>, 29, 229-234.
- Sreethawong, T. and Yoshikawa, S. (2005). Comparative investigation on photocatalytic hydrogen evolution over Cu-, Pd-, and Au-loaded mesoporous TiO<sub>2</sub> photocatalysts. <u>Catalysis Communications</u>, 6, 661-668.
- Sreethawong, T. and Yoshikawa, S. (2005). Enhanced photocatalytic hydrogen evolution over Pt supported on mesoporous TiO<sub>2</sub> prepared by single-step sol-gel process with surfactant template. <u>International Journal of Hydrogen</u> <u>Energy</u>, 31, 786-796.
- Sreethawong, T., Junbua, C., and Chavadej, S. (2009). Photocatalytic H<sub>2</sub> production from water splitting under visible light irradiation using Eosin Y-sensitized mesoporous-assembled Pt/TiO<sub>2</sub> nanocrystal photocatalyst. Journal of Power Sources, 190, 513-524.
- Sreethawong, T., Laehsalee, S., and Chavadej, S. (2008). Comparative investigation of mesoporous- and non-mesoporous-assembled TiO<sub>2</sub> nanocrystals for photocatalytic H<sub>2</sub> production over N-doped TiO<sub>2</sub> under visible light irradiation. <u>International Journal of Hydrogen Energy</u>, 33, 5947-5957.
- Torres, G.R., Lindgren, T., Lu, J., Granqvist. C.G., and Lindquist, S.E. (2004). Photoelectrochemical study of nitrogen-doped titanium dioxide for water oxidation. Journal of Physical Chemistry B, 108, 5995-6003.
- Umebayashi, T., Yamaki, T., Itoh, H., and Asai, K. (2002). Band gap narrowing of titanium dioxide by sulfur doping. <u>Applied Physics Letters</u>, 81(3), 454-456.
- Vorontsov, A.V., Savinov, E.N., and Zhensheng, J. (1999). Influence of the form of photodeposited platinum on titania upon its photocatalytic activity in CO and acetone oxidation. <u>Journal of Photochemistry and Photobiology</u>, 125, 113-117.
- Wang, C.C. and Ying, J. (1999). Sol-gel synthesis and hydrothermal processing of anatase and rutile titania nanocrystals. <u>Chemistry of Materials</u>, 11, 3113-3120.

- Wu, J.C. and Chen, C.H. (2004). A visible-light response vanadium-doped titania nanocatalyst by sol-gel method. <u>Journal of Photochemistry and</u> <u>Photobiology A: Chemistry</u>, 163, 509-515.
- Wu, N.L. and Lee, M.S. (2004). Enhanced TiO<sub>2</sub> photocatalysis by Cu in hydrogen production from aqueous methanol solution. <u>International Journal of</u> <u>Hydrogen Energy</u>, 29(15), 1601-1605.
- Yu, P., Cui, B., and Ship, Q. (2008.) Preparation and characterization of BaTiO<sub>3</sub> powders and ceramics by sol-gel process using oleic acid as surfactant. <u>Materials Science and Engineering A</u>, 473, 34-41.
- Zhang, H.Z. and Banfield, J.F. (2000). Understanding polymorphic phase transformation behavior during growth of nanocrystalline aggregates: Insights from TiO<sub>2</sub>. Journal of Physical Chemistry B, 104, 3481-3487.
- Zhang, Z., Wang, C.C., Zakaria, R., and Ying, J.Y. (1998). Role of particle size in nanocrystalline TiO<sub>2</sub>-based photocatalysts. <u>Journal of Physical Chemistry</u> <u>B</u>, 102, 10871-10878.
- Zou, J.J., He, H., Cui, L., and Du, H.Y. (2007). Highly efficient Pt/TiO<sub>2</sub> photocatalyst for hydrogen generation prepared by a cold plasma method. <u>International Journal of Hydrogen Energy</u>, 32, 1762-1770.

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