



REFERENCES

- Anpo M. (2004). Preparation, characterization, and reactivities of high functional titanium oxide-based photocatalysts able to operate under UV-visible light irradiation: approaches in realizing high efficiency in the use of visible light. Bull Chem Soc Jpn, 77, 1427-42.
- Archer, M.D., and Bolton, J.R. (1990). Requirements for ideal performance of photochemical and photovoltaic solar energy converters. Journal of Physical Chemistry, 94, 8028-8036.
- Ashokkumar, M. (1998). An overview on semiconductor particulate systems for photoproduction of hydrogen. International Journal of Hydrogen Energy, 34 (6), 427-438.
- Avudaithai, M., and Kutty, T.R.N., (1987). Mater. Res. Bull., 22, 641.
- Bak, T., Nowotny, J., Rekas, M., and Sorrell, C.C. (2002). Photo-electrochemical hydrogen generation from water using solar energy. International Journal of Hydrogen Energy, 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-TiO₂ and Pt-TiO₂. Journal of Photochemistry and Photobiology A: Chemistry, 89, 177-189.
- Bard, A.J., and Fox, M.A. (1995). Artificial photosynthesis: solar splitting of water to hydrogen and oxygen. Accounts of Chemical Research, 28, 141-145.
- Carp, O., Huisman, C.L., and Reller, A. (2004). Photoinduced reactivity of titanium dioxide. Progress in Solid State Chemistry, 32, 33-177.
- Chen, Liang., Zhang, Shouchen., Wang, Liqu., Xue, Dongfeng., and Yin, Shu. (2009). Photocatalytic activity of Zr:SrTiO₃ under UV illumination. Journal of Crystal Growth, 311, 735-737.
- Chen, X.B., and Mao, S.S. (2007). Titanium dioxide nanomaterials: synthesis, properties, modifications, and applications. Chemical Reviews, 107, 2891-2959.

- Cristante, Valtair M., Prado, Alexandre, G.S., Jorge, Sonia M.A., Valente Jose P.S., Florentino, Arioaldo O., and Padilha, Pedro M. (2008). Synthesis and characterization of TiO₂ chemically modified by Pd(II) 2-aminothiazole complex for the photocatalytic degradation of phenol. Journal of Photochemistry and Photobiology A : Chemistry, 195, 23-29.
- Deng, X., Yue, Y., and Gao, Z. (2002). Gas phase photo-oxidation of organic compounds over nanosized TiO₂ photocatalysts by various preparations. Applied Catalysis B: Environmental, 39, 135-147.
- Dhanalakshmi, K.B., Latha, S., Anandan, S., and Maruthamuthu, P. (2000). Dye sensitized hydrogen evolution from water. International Journal of Hydrogen Energy, 26, 669-674.
- Ding, X., and Liu, X. (1998). Correlation between anatase-to-rutile transformation and grain growth in nanocrystalline titania. Journal of Materials Research, 13, 2556-2559.
- Emeline A, Rudakova A, Ryabchuk V, and Serpone N. (1998). Photostimulated reactions at the surface of wide bandgap metal oxides (ZrO₂ and TiO₂): Interdependence of rates of reactions on pressure-concentration and on light intensity. Journal of Physical Chemistry B, 102, 10906-16.
- Fujishima, A., and Honda, K. (1972). Electrochemical photolysis of water at a semiconductor electrode. Nature, 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. Catalysis Today, 51, 233-254.
- Hirano, Masanori., Nakahara, Chiaki, Ota, Keisuke., Tanaike, Osamu., and Inagaki, Michio. (2003). Photoactivity and phase stability of ZrO₂-doped anatase-type TiO₂ directly formed as nanometer-sized particles by hydrolysis under hydrothermal conditions Journal of Solid State Chemistry, 170, 39-47.

- Hoffmann, M.R., Martin, S.T., Choi, W., and Bahnemann, D.W. (1995). Environmental applications of semiconductor photocatalysis. Chemical Reviews, 95, 69-96.
- Hu, L., Flanders, M.P., Miller, L.P., and Strathmann, J.T. (2007). Oxidation of sulfamethoxazole and related antimicrobial agents by TiO₂ photocatalysis. Water Research, 41, 2612 – 2626.
- Ishizaki, K., Komarneni, S., and Nanko, M. (1988). Porous Materials Process Technology and Applications, Kluwer Academic Publisher, London.
- Jung, K.Y., and Park, S.B. (2004). Photoactivity of SiO₂/TiO₂ and ZrO₂/TiO₂ mixed oxides prepared by sol-gel method. Materials Letters, 58, 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 4-chlorophenol in aqueous solution by deposition of CdS on TiO₂. Journal of Photochemistry and Photobiology A: Chemistry, 124, 119-125.
- Khunrattanaphon, P., Sreethawong, T. and Chavadej, C. (2011). Synthesis and application of novel mesoporous-assembled SrTi_xZr_{1-x}O₃ based nanocrystal photocatalysts for azo dye degradation. Chemical Engineering Journal, 170, (292-307).
- Kobasa, I.M., Kondratyeva, I.V., and Vorobets, G.I. (2008). TiO₂-Me_nO_m-based materials. Superlattices and Microstructures, 44, 496-505.
- 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. Catalysis Today, 122, 51-61.
- Mills, A., Lee, S.K., and Lepre, A. (2003). Photodecomposition of ozone sensitised by a film of titanium dioxide on glass. Journal of Photochemistry and Photobiology A: Chemistry, 155, 199-205.
- Moreira, M.L., Andres, J., Longo, V.M., Li, M.S., Varela, J.A., and Longo, E. (2009). Photoluminescent behavior of SrZrO₃/SrTiO₃ multilayer thin films. Chemical Physics, In Press.

- Mugglie, D.S., and Ding, L. (2001). Photocatalytic performance of sulfated TiO₂ and Degussa P-25 TiO₂ during oxidation of organics. Applied Catalysis B: Environmental, 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 TiO₂ photocatalysts. International Journal of Hydrogen Energy, 30, 687-691.
- Ollis, D.F., and Al-Ekabi, H. (1993). Photocatalytic Purification and Treatment of Water and Air, Elsevier, Amsterdam.
- Onsuratoom, S., Chavadej, C., and Sreethawong, T. (2011). Hydrogen production from water splitting under UV light irradiation over Ag-loaded mesoporous-assembled TiO₂-ZrO₂ mixed oxide nanocrystal photocatalysts. International Journal of Hydrogen Energy, 36, 5246-5261.
- Onsuratoom, S., Puangpetch, T., and Chavadej, C., (2011). Comparative investigation of hydrogen production over Ag-, Ni-, and Cu-loaded mesoporous-assembled TiO₂-ZrO₂ mixed oxide nanocrystal photocatalysts. Chemical Engineering Journal, 173, 667-675.
- Patsoura A, Kondarides DI, and Verykios XE. (2007). Photocatalytic degradation of organic pollutants with simultaneous production of hydrogen. Catalyst Today, 124, 94-102.
- Puangpetch, T., Sreethawong, T., Yoshikawa, S., and Chavadej, S. (2008). Synthesis and photocatalytic activity in methyl orange degradation of mesoporous-assembled SrTiO₃ nanocrystals prepared by sol-gel method with the aid of structure-directing surfactant. Journal of Molecular Catalysis A: Chemical, 287, 68-77.
- Puangpetch, T., Sreethawong, T., Yoshikawa, S., and Chavadej, S. (2009). Hydrogen production from photocatalytic water splitting over mesoporous-assembled SrTiO₃ nanocrystal-based photocatalysts. Journal of Molecular Catalysis A: Chemical, 312, 97-106.

- Puangpetch, T., Sreethawong, T., Yoshikawa, S., and Chavadej, S. (2010). Hydrogen production over metal-loaded mesoporous-assembled SrTiO₃ nanocrystal photocatalysts: Effects of metal type and loading. International Journal of Hydrogen Energy, 35, 6531-6540.
- Puangpetch, T., Sreethawong, T., and Chavadej, S. (2011). Hydrogen production from photocatalytic water splitting over mesoporous-assembled SrTiO₃ nanocrystal-based photocatalysts. Energy Conversion and Management, 52, 2256-2261.
- Rajeshwar, K. (1995). Photoelectrochemistry and the environment. Journal of Applied Electrochemistry, 25, 1067-1082.
- Robertson P.K.J. (1996). Semiconductor photocatalysis: an environmentally acceptable alternative production technique and effluent treatment process. Journal of Cleaner Production, 4 (3-4), 203-212.
- Rouquerol, F., Rouquerol, J., and Sing, K. (1999). Adsorption by Powders and Porous Solid: Principle, Methodology and Applications, 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 TiO₂ catalyst. Water Research, 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. Sensors and Actuators B: Chemical, 79, 17-27.
- Seo Jeoung Gil, Hye Youn Min; Ryul Park Dong, Nam Insung, and Song In Kyu (2009). Hydrogen production by steam reforming of liquefied natural gas (LNG) over Ni-Al₂O₃ catalysts prepared by a sequential precipitation method: Effect of precipitation agent. International Journal of Hydrogen Energy, 34, 8053-8060.
- Serpone, N., and Pelizzetti, E. (1989). Photocatalysis: Fundamentals and Applications, Wiley, New York.

- Sreethawong, T., and Yoshikawa, S. (2005). Comparative investigation on photocatalytic hydrogen evolution over Cu-, Pd-, and Au-loaded mesoporous TiO₂ photocatalysts. Catalysis Communications, 6, 661-668.
- Sreethawong, T., and Yoshikawa, S. (2005). Enhanced photocatalytic hydrogen evolution over Pt supported on mesoporous TiO₂ prepared by single-step sol-gel process with surfactant template. International Journal of Hydrogen Energy, 31, 786-796.
- Subramanian, V., Karki, A., Gnanasekar, K.I., Eddy, F., and Rambabu, B., (2006) Nanocrystalline TiO₂ (anatase) for Li-ion batteries. Journal of Power Sources, 159, 186-192.
- Vali, R. (2007). Band structure and dielectric properties of orthorhombic SrZrO₃. Solid State Communications, 145, 497-501.
- Wang, C.C., and Ying, J. (1999). Sol-gel synthesis and hydrothermal processing of anatase and rutile titania nanocrystals. Chemistry of Materials, 11, 3113-3120.
- Wang, G.B., Wang, Y.J., Song, B.J., Xu, Y.Q., and Chin. J. (2003) Inorganic Chemistry, 19, 988.
- Wu, J.C., and Chen, C.H. (2004). A visible-light response vanadium-doped titania nanocatalyst by sol-gel method. Journal of Photochemistry and Photobiology A: Chemistry, 163, 509-515.
- Wu, N.L., and Lee, M.S. (2004). Enhanced TiO₂ photocatalysis by Cu in hydrogen production from aqueous methanol solution. International Journal of Hydrogen Energy, 29(15), 1601-1605.
- Yakovlev, V.A., Khromova, S.A., Sherstyuk, O.V, Dundich, V.O., Ermakov, D.Yu., Novopashina, V.M., Lebedev, M.Yu., Bulavchenko, O., and Parmon, V.N., (2009). Development of new catalytic systems for upgraded bio-fuels production from bio-crude-oil and biodiesel, Catalysis Today, 144, 362-366.
- Yang H, Guo L, Yan W, and Liu H. (2006). A novel composite photocatalyst for water splitting hydrogen production. Journal of Power Sources, 159, 1305-1309.

- Yu J, Lin J, and Kwok R. (1998) $\text{Ti}_{1-x}\text{Zr}_x\text{O}_2$ solid solutions for the photocatalytic degradation of acetone in air. Journal of Physical Chemistry B, 102, 5094-5098.
- Yu, P., Cui, B., and Ship, Q. (2008). Preparation and characterization of BaTiO_3 powders and ceramics by sol-gel process using oleic acid as surfactant. Materials Science and Engineering A, 473, 34-41.
- Zhang, H.Z., and Banfield, J.F. (2000). Understanding polymorphic phase transformation behavior during growth of nanocrystalline aggregates: Insights from TiO_2 . 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_2 -based photocatalysts. Journal of Physical Chemistry B, 102, 10871-10878.
- Zou, J., He, H., Cui, L., and Du, H.Y. (2007). Highly efficient Pt/ TiO_2 photocatalyst for hydrogen generation prepared by a cold plasma method. International Journal of Hydrogen Energy, 32, 1762-1770.

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