

## DAFTAR PUSTAKA

- Altin, I., Sokmen, M., and Bryklioglu, Z., 2016, Sol-gel Synthesis of Cobalt Doped TiO<sub>2</sub> and Its Dye Sensitization for Efficient Pollutant Removal, *Mater. Sci. Semicond. Process.*, 45, 36-44.
- Bedikyan, L., Zakhariev, S., and Zakharieva, M., 2013, Titanium Dioxide Thin Films: Preparation and Optical Properties, *J. Univ. Chem. Technol. Metallurgy*, 48(6), 555-558.
- Boutlala, A., Bourfaa, F., Mahtili, M., and Bouaballou, A., 2016, Deposition of Co-doped TiO<sub>2</sub> Thin Films by Sol-gel Method, *IOP Conf. Ser. Mater. Sci. Eng.*, 108, 1-5.
- Chatwall, G., 1985, *Spectroscopy Atomic and Molecule*, Himalaya Publishing House, Mumbai.
- Chen, X., and Mao, S. S., 2007, Titanium Dioxides Nanomaterials: Synthesis, Properties, Modification, and Applications, *Chem. Rev.*, 107(7), 2891-3638.
- Choi, J., Park, H., and Hoffmann, 2010, Effect of Single Metal Ion Doping on The Visible-Light Photoreactivity of TiO<sub>2</sub>, *J. Phys. Chem. C.*, 114, 783-792.
- Choudhury, B. and Choudhury, A., 2012, Luminescence Characteristics of Cobalt Doped TiO<sub>2</sub> Nanoparticles, *J. Lumin.*, 132, 178-184.
- Christensen, p. A., Curtis, T. P., Egerton, T. A., Kosa, S. A. M., and Tinlin, J. R., 2003, Photoelectrocatalytic and Photocatalytic Disinfection of *E. Coli* Suspensions by Titanium Dioxide, *Appl. Catal. B*, 41, 371-386.
- Das, L., Barodia, S. K., Sengupta, S., and Basu, J. K., 2015, Aqueous Degradation Kinetics of Pharmaceutical Drug Diclofenac by Photocatalysis Using Nanostructured Titania-Zirconia Composite Catalyst, *Int. J. Environ. Sci. Technol.*, 12, 317-326.
- Dragan, N., Crisan, M., Raileanu, M., Crisan, D., Lanculescu, A., Oancea, P., Somacescu, S., Todan, L., Stanica, N., and Vasile, B., 2014, The Effect of Co-Dopant on TiO<sub>2</sub> Structure of Sol-gel Nanopowders Used as Photocatalysts, *Ceram. Int.*, 40, 12273-12284.
- Elbushra, H., Ahmed, M., Wardi, H., and Eassa, N., 2018, Synthesis and Characterization of TiO<sub>2</sub> using Sol-gel Method at Different Annealing Temperatures, *MRS Adv.*, 3, 2527-2535.
- El-Sharkawy, E. A., Soliman, A. Y., and Al-Amer, k. M., 2007, Comparative Study for The Removal of Methylene Blue via Adsorption and Photocatalytic Degradation, *J. Colloid Interface Sci.*, 310(2), 498-508.

- Fathy, A., Elkady, O. dan Abu-Oqail, A., 2017, Synthesis and Characterization of Cu-ZrO<sub>2</sub> Nanocomposite Produced by Thermochemical Process, *J. Alloys Compd.*, 719, 411-419.
- Fujishima, A., and Honda, K., 1972, Electrochemical Photolysis of water at A Semiconductor Electrode, *Nature*, 238, 37-38.
- Gomes, J., Lincho, J., Domingues, E., Quinta-Ferreira, R., and Martins, R., 2019, N-TiO<sub>2</sub> Photocatalysts: A Review of Their Characteristics and Capacity for Emerging Contaminants Removal, *Water*, 11, 373.
- Gorban, O., Synyakina, S., Volokova, G., Gorban, S., Konstantiova, T., and Lyubchik, S., 2015, Formation of Metastable Tetragonal Zirconia Nanoparticles; Competitive Influence of The Dopants and Surface State, *J. Solid State Chem.*, 232, 249-255.
- Hermawan, P., 2015, Sintesis Fe(II), Co(II), dan Ni(II) doped TiO<sub>2</sub> dengan Metode Sol-gel serta Uji Fotoaktivitasnya pada Degradasi Biru Metilena, *Disertasi*, Program Studi S3 Ilmu Kimia FMIPA UGM, Yogyakarta.
- Hoffman, M.R., Martin, S. T., Choi, W., and Bahnemann, D, W., 1995, Environmental Applications of Semiconductor Photocatalysis, *Chem. Rev.*, 95, 69-96.
- Ilkheci, N. N., and Kaleji, B. K., 2014, High Temperature Stability and Photocatalytic Activity of Nanocrystalline Anatase Powders with Zr and Si Co-Dopants, *J. Sol-Gel Sci. Technol.*, 69, 351-356.
- Iwasaki, M., Hara, M., Kawada, H., Tada, H., dan Ito, S., 2000, Cobalt Ion-doped TiO<sub>2</sub> Photocatalyst Response to Visible Light, *J. Coll. Inter. Sci.*, 224(1), 202-204.
- Karthik, K., Pandian, S. K., Kumar, K. S., and Jaya, N. V., 2010, Influence of Dopant Level on Structural, Optical, and Magnetic Properties of Co-doped Anatase TiO<sub>2</sub> Nanoparticles, *Appl. Surf. Sci.*, 256, 4757-4760.
- Kim, J. Y., Kim, C. S., Chang, H. K., and Kim, T. O., 2011, Synthesis and Characterization of N Doped TiO<sub>2</sub>/ZrO<sub>2</sub> Visible Light Photocatalyst, *Adv. Pow. Tech.*, 22, 443-448.
- Kirit, S., and Dimple, S., 2012, Characterization of Nanocrystalline Cobalt Doped TiO<sub>2</sub> Sol-gel Material, *J. Cryst. Growth*, 352, 224-228.
- Krejciakova, S., Koci, K., Obalova, L., Capek, L., and Solcova, O., 2012, *Chemistry for Sustainable Development*, Chapter 24th, Springer, London.
- Lakstiarini, B., 2018, Sintesis Fe-doped ZrO<sub>2</sub> sebagai Model Fotokatalis Responsif Sinar Tampak Menggunakan Variasi Konsentrasi Garam FeSO<sub>4</sub>.7H<sub>2</sub>O dan Suhu Kalsinasi, *Skripsi*, Program Studi S1 Kimia FMIPA UGM, Yogyakarta.

- Lavand, A.B., Malghe, Y.S., and Singh, S.H., 2015, Synthesis, Characterization, and Investigation of Visible Light Photocatalytic Activity of C Doped TiO<sub>2</sub>/CdS Core-Shell Nanocomposite, *Indian J. Mater. Sci.*, 2015, 1–9.
- Linsebigler, A. L., Lu, G., and Yates Jr, J. T., 1995, Photocatalysis on TiO<sub>2</sub> surfaces: principles, mechanisms, and selected results, *Chem. Rev.*, 95(3), 735-758.
- Mahtali, M., Boudjema, E.-H., Boutelala, A., Bourfaa, F., Mahcene, F., Hanini, F., and Bouabellou, A., 2012, Preparation of Co-doped TiO<sub>2</sub> Thin Films Deposited by Sol-gel Method, *AIP Conf. Proc.*, 1476, 386–392.
- Malengreaux, C. M., Pirard, S. L., Bartlett, J. R., and Heinrichs, B., 2014, Kinetic Study of 4-Nitrophenol Photocatalytic Degradation Over a Zn<sup>2+</sup> Doped TiO<sub>2</sub> Catalyst Prepared Through An Environmentally Friendly Aqueous Sol-gel Process, *Chem. Eng. J.*, 245, 180-190.
- Mostaghni, F. and Abed, Y., 2016, Structural, Optical and Photocatalytic Properties of Co-TiO<sub>2</sub> Prepared by Sol-Gel Technique, *Mater. Res.*, 19, 741–745.
- Mugundan, S., Rajamannan, B., Viruthagiri, G., Shanmugam, N., Gobi, R., and Praveen, P., 2014, Synthesis and Characterization of Undoped and Cobalt-doped TiO<sub>2</sub> Nanoparticles via Sol-gel Technique, *Appl. Nanosci.*, 5, 449-456.
- Okabayashi, J., Kono, S., Yamada, Y., and Nomura, K., 2011, Fabrication and Magnetic Properties of Fe and Co co-doped ZrO<sub>2</sub>, *AIP Adv.*, 1, 1-8.
- Pirzada, B. M., Mir, N. A., Qutub, N., Mehraj, O., Sabir, S. dan Muneer, M., 2015, Synthesis, Characterization and Optimization of Photocatalytic Activity of TiO<sub>2</sub>/ZrO<sub>2</sub> Nanocomposite Heterostructures, *Mater. Sci. Eng., A*, 193, 137-145.
- Pratsini, S. E., 1998, Synthesis of Ceramic Powders, *Prog. Energy Combust. Sci.*, 24, 197-219.
- Ryu, S. W., Kim, E. J., Ko, S.K., and Hahn, S. H., 2004, Effect of Calcination The Structural and Optical Properties of M/TiO<sub>2</sub> Thin Films by RF Magnetron co-Sputtering, *Mater. Lett.*, 58, 582-587.
- Samet, L., Nasseur, J. B., Chtourou, R., March, K., and Stephan, O., 2013, Heat Treatment Effect on the Physical Properties of Cobalt Doped TiO<sub>2</sub> Sol-gel Materials, *Mater. Charact.*, 85, 1-12.
- Shannon, R. D., 1976, Revised Effective Ionic Radii and Systematic Studies of Interatomic Distances in Halides and Chalcogenides, *Acta Cryst.*, A32, 751-767.
- Slamet, Syakur, R., dan Danumulyo, W., 2003, Pengolahan Limbah Logam Berat Chromium (VI) dengan Fotokatalis TiO<sub>2</sub>, *Makara Teknologi*, 7(1), 27-32.
- Smart, L., and Moore, E., 1995, *Introduction to Surface Chemistry and Catalysis*, John Wiley and Sons Inc., Kanada.

- Sotyanova, A., Sredkova, M., Lordanova, R., Dimitriev, Y., and Bchvarova-Nedelcheva, A., 2010, Nonhydrolytic Sol-Gel Synthesis and Antibacterial Properties of Nanosized TiO<sub>2</sub>, *Optoelectron. Adv. Mater.*, 4, 2059-2063.
- Stengl, B., Bakardijeva, S., and Murafa, N., 2009, Preparation and Photocatalytic Activity of Rare Earth Doped TiO<sub>2</sub> Nanoparticles, *Mater. Chem. Phys.*, 114, 217-226.
- Tian, J., Deng, H., Sun, L., Kong, H., Yang, P., and Chu, J., 2011, Effect of Co Doping on Structure and Optical Properties of TiO<sub>2</sub> Thin Films Prepared by Sol-gel Method, *J. Phys. E: Low. Dimens. Sys. Nano.*, 44, 550-554.
- Tomar, L. J., Bhatt, p. J., Desai, R. K., and Chakrabarty, B. S., 2014, Effect of Preparation Method on Optical and Structural Properties of TiO<sub>2</sub>/ZrO<sub>2</sub> Nanocomposite, *J. Nano. Adv. Mat.*, 2-27-33.
- Trisunaryanti, W., 2014, *Material Katalis dan Karakternya*, Gadjah Mada University Press, Yogyakarta.
- Tsang, C.H.A., Li, K., Zeng, Y., Zhao, W., Zhang, T., and Zhan, Y., 2019, Titanium Oxide based Photocatalytic Materials Development and Their Role of in the Air Pollutants Degradation: Overview and Forecast, *Environ. Int.*, 125, 200–228.
- Vaizogullar, A.I., Balci, A., Ugurlu, M., and Karaoglu, M.H., 2016, Synthesis of TiO<sub>2</sub> and ZrO<sub>2</sub>/TiO<sub>2</sub> Composite Microspheres and Their Photo-Catalytic Degradation of Methylene Blue, *Afyon Kocatepe Univ. J. Sci. Eng.*, 16, 54–60.
- Wellia, D. V., Xu, Q. C., Alam, S. K. M., Lim, K. H., Lim, T. M., and Tan, T. T. Y., 2011, Experimental and Theoretical Studies of Fe-doped TiO<sub>2</sub> Films Prepared by Peroxo Sol-gel Method, *Appl. Catal. A*, 401, 98-106.
- Zeng, L., Sun, H., Peng, T., and Lv, X., 2019, Comparison of the Phase Transition and Degradation of Methylene Blue of TiO<sub>2</sub>, TiO<sub>2</sub>/Montmorillonite Mixture and TiO<sub>2</sub>/Montmorillonite Composite, *Front. Chem.*, 7, 1-10.
- Zhang, X., and Liu, Q., 2009, Visible Light Induced Degradation of Formaldehyde over Titania Photocatalyst Co-doped with Nitrogen and Nickel, *Appl. Surf. Sci.*, 254 (15), 4780-4787.
- Zhang, B., Cao, S., Du, M., Ye, X., Wang, Y., and Ye, J., 2019(a), Titanium Dioxide (TiO<sub>2</sub>) Mesocrystals: Synthesis, Growth Mechanisms and Photocatalytic Properties, *Catalysts*, 9, 91.
- Zhang, F., Wang, X., Liu, H., Liu, C., Wan, Y., Long, Y., and Cai, Z., 2019(b), Recent Advances and Applications of Semiconductor Photocatalytic Technology, *Appl. Sci.*, 9, 2489, 1-43.