

DAFTAR PUSTAKA

- [1] Garvasis, J et.al. 2020. Abraham Joseph Efficient removal of Congo red from aqueous solutions using phytogetic aluminum sulfate nano coagulant. *Materials Chemistry and Physics* 251:123040.-156044 [.https://doi.org/10.1016/j.matchemphys.2020.123040](https://doi.org/10.1016/j.matchemphys.2020.123040)
- [2] Ulum, B., et.al. 2020. Composite Carbon-lignin/ Zinc Oxide Nanocrystalline Ball-like Hexagonal Mediated from Jatropha curcas L Leaf as Photocatalyst for Industrial Dye Degradation, *Journal of Inorganic and Organometallic Polymers and Materials* <https://doi.org/10.1007/s10904-020-01631-5>
- [3] Loudjania, N., Gouasmia, T., Bououdina, M., & Bobetd, J. L. 2020. Phase formation and magnetic properties of nanocrytalline Ni₇₀Co₃₀ alloy prepared by mechanical alloying, *Journal of Alloys and Compounds*.Volume 846.156392 <https://doi.org/10.1016/j.jallcom.2020.156392>
- [4] Arik, B., 2020. Characterization and Wrinkle Resistance Enhancement by Sol-Gel Method of Variously Pretreated Linen Fabrics, *Fibers and Polymers* 21(1) 82-89. <https://doi.org/10.1007/s12221-020-9329-6>
- [5] Liao, D., Jia, Z., Yang, Y., Li. 2020. Improved toughness of ZrB₂-SiC composites with nanopowders obtained by mechanical alloying, *Journal of Physics and Chemistry of Solids* 136: 109-153. <https://doi.org/10.1016/j.jpics.2019.109153Get>
- [6] Long, N. V., Khanh, D. N., Binh, N. H., Hai. 2020. Thermoelectric properties of quaternary chalcogenide Cu₂ZnSnS₄ synthesised by mechanical alloying, *Powder Metallurgy* 63(3) 220-226.

<https://doi.org/10.1080/00325899.2020.1783103>

- [7] Zhang W, et.al. 2019. Equiaxial nano-crystals Nb₃Al superconductor prepared by optimized mechanically alloying, *Mater Sci, J* 54: 5022–5031. <https://doi.org/10.1007/s10853-018-2918-8>
- [8] Xua et.al. 2019. Microstructure and magnetic properties of amorphous/nanocrystalline Ti₅₀Fe₅₀ alloys prepared by mechanical alloying, *Journal of Material Research and Technology* 83: 2486- 2493. <https://doi.org/10.1016/j.jmrt.2019.02.007>
- [9] Mursalat, M., Schoenitz, E. L., & Dreizin. 2019. Composite Al·Ti powders prepared by high-energy milling with different process controls agents, *Advanced Powder Technology* 30 1319–1328. <https://doi.org/10.1016/j.appt.2019.04.007>
- [10] Tabie, V et.al. 2019. Tribological Properties of Ti–4Si– xZr– Y₂O₃/5TiO₂ Composites Prepared by High-Energy Milling , Cold Pressing and Sintering, *International Journal of Precision Engineering and Manufacturing* 20: 1929–1937. <https://doi.org/10.1007/s12541-019-00193-y>.
- [11] Titorenkova, R., Dyulgerova, E., Petkova, V., & Ilieva, R. 2019. Carbonation and dehydroxylation of apatite during high energy milling of biphasic Ca-phosphate ceramics. *Ceramics International*. Volume 45, Issue 6, Pages 7025-7033. <https://doi.org/10.1016/j.ceramint.2018.12.204>
- [12] Roy, N., & Chakraborty, S. 2020. ZnO as photocatalyst: An approach to waste water treatment. *Materials Today: Proceedings*. <https://doi.org/10.1016/j.matpr.2020.06.264>
- [13] Ying L. Y.,Pung, S. Y., Ong, M. T., & Pung, Y. F. 2018. Photocatalytic

activity of ZnO nanodisks in degradation of Rhodamine B and Bromocresol Green under UV light exposure, *Journal of Physics*.
<https://doi:10.1088/17426596/1082/1/012085>

- [14] Chang, T. H., Cheng, Y., Wu, C. S. 2020. Ag nanoparticles decorated ZnO: Al nanoneedles as a highperformance surface-enhanced Raman scattering substrate, *Journal of Alloys and Compounds*
<https://doi.org/10.1016/j.jallcom.2020.156044>
- [15] Khan, M.S. Khan, M. Zulfequar, M.S. Khan, 2010 Optical and Structural Properties of ZnO Thin Film Fabricated by Sol-gel Method, *Material Science and Application* 2: 340-345.
- [16] Zhili, dkk. 2017. Carbon dots: Biomacromolecule interaction, bioimaging and nanomedicine, *Coordination Chemistry Reviews* 343: 256-277.
- [17] Merzouk. B, Gourich. B, Madani. K, Vial, Sekk. A, 2011. Removal of a disperse red dye from synthetic wastewater by chemical coagulation and continuous electrocoagulation. A comparative study, *Desalination*, 0011-9164.
- [18] Amin, A. Al Bazedi, G. Mona A. Abdel-Fatah, 2020. Experimental study and mathematical model of coagulation/ sedimentation units for treatment of food processing wastewater, *Ain Shams Engineering Journal*, 2090-4479.
- [19] M. H. Elsayeda, T. M. Elmorsi, A. M. Abuelela, Ahmed E. Hassan, A. Z. Alhakem, F. Mostafa, Bakr, H. Chou, 2020. Direct sunlight-active Na-doped ZnO photocatalyst for the mineralization of organic pollutants at different pH mediums. *Journal of the Taiwan Institute of Chemical Engineers*. 1876-1070.
- [20] Abdallah R. Taha S. 2012. Biosorption of methylene blue from aqueous solution by nonviable *Aspergillus fumigatus*, *Chemical Engineering Journal*, 1385-8947.
- [21] Suryanarayana H. 2019. Mechanical Alloying: A Novel Technique to Synthesize Advanced Materials, *Research*

- [22] Xua, Y. Zhou, S. Liao, B. Zhao, S. Dai, X. Chen, D. 2019. Effect of milling time on the microstructure and magnetic properties of amorphous Ti₅₀Fe₅₀ alloys prepared by mechanical alloying, 2238-7854.
- [23] Soleh, M.B. & Purwaningsih B. 2013. Pengaruh Milling Time Terhadap Pembentukan Intermetalik γ -TiAl Sebagai Reinforced Dalam Metal Matrix Composite (MMCs) Hasil Mechanical Alloying, *Jurnal Teknik Pomits* Vol. 2, No. 1, 2337-3539.
- [24] Olga, W. Natalia, S. Krzysztof, B. Marcin, 2021 Photocatalytic properties of coating materials enriched with bentonite/ZnO/CuO nanocomposite, *Material chemistry and physics* 260 :124-150.
- [25] Suharyadi, E., et.al., 2020. Photocatalytic activity of magnetic core shell CoFe₂O₄/ZnO ZnO nanoparticles for methylene blue purification, *Materials Research Express* 7:085013 <https://doi.org/10.1088/2053-1591/abafd1>
- [26] M. R. Nasrabadi, M. Behpour, A.S. Nasab, M.R. Jeddy, Nanocrystalline CeDoped Copper Ferrite: Synthesis, Characterization, And Its Photocatalyst Application, *J Mater Sci: Mater Electron.* 27(2016) 11691-11697
- [27] J. Revathi, M. J. Abel, V. Archana, T. Sumithra, R. Thiruneelakandan, J. Joseph Prince, Synthesis And Characterization Of CoFe₂O₄ And Ni-Doped CoFe₂O₄ Nanoparticles By Chemical Co-Precipitation Technique For PhotoDegradation Of Organic Dyestuffs Under Direct Sunlight, *Physica B: Physics Of Condensed Matter.* 587 (2020) 412136
- [28] A. Kalam, A.G. Al-Sehemi, M. Assiri, G. Du, T. Ahmad, I. Ahmad, M. Pannipara, Modified Solvothermal Synthesis Of Cobalt Ferrite (CoFe₂O₄) Magnetic Nanoparticles Photocatalysts For Degradation Of Methylene Blue With H₂O₂/Visible Light, *Result In Physics.* 8 (2018) 1046-105.
- [29] Reddy., et.al. 2019. Effect of ball milling on optical properties and visible photocatalytic activity of Fe doped ZnO nanoparticles, *Materials Science & Engineering B.* 33-40 <https://doi.org/10.1016/j.mseb.2019.01.002>
- [30] Naik, E. I et.al. 2020. Influence of Cu doping on ZnO nanoparticles for improved structural, optical, electrochemical properties and their

- applications in efficient detection of latent fingerprints, *Chemical Data Collections* 33: 100671 <https://doi.org/10.1016/j.cdc.2021.100671>
- [31] Kisan, B., Kumar, J., & Alagarsamy, P. 2020. Experimental and first-principles study of defect-induced electronic and magnetic properties of ZnO nanocrystals, *Journal of Physics and Chemistry of Solids*, 146;109580 <https://doi.org/10.1016/j.jpics.2020.109580>
- [32] Alias, S.S, Ismail, A.B., & Mohamad A.A. 2010. Effect of pH on ZnO nanoparticle properties synthesized by sol–gel centrifugation. *Journal of Alloys and Compounds* 499: 231–237
- [33] Ouatib, R. E et.al. 2005 Reactivity of aluminum sulfate and silica in molten alkali-metal sulfates in order to prepare mullite, *Journal of the European Ceramic Society* 25; 73–80
- [34] Leo, C.P., Cathie, W., Lee, P., Ahmada, A. L., & Mohammad, A. W., 2012. Polysulfone membranes blended with ZnO nanoparticles for reducing fouling by oleic acid, *Separation and Purification Technology* Volume 89. Pages 51-56
- [35] Saritha, V., Karnena, M. K., Dwarapureddi, B. K. 2019, “Exploring natural coagulants as impending alternatives towards sustainable water clarification” – A comparative studies of natural coagulants with alum, *Journal of Water Process Engineerin*, 32; 100982.
- [36] Moghaddas, S. M. T. H., Elahi, B., & Javanbakht, V. 2020. Biosynthesis of pure zinc oxide nanoparticles using quince seed mucilage for photocatalytic dye degradation, *Journal of Alloys and Compounds* 821 1-9.
- [37] Maimuna., Monado, F., Royan,i I. 2020. Studi awal pengaruh kloroform sebagai pelarut pada proses ekstraksi molecularly imprinted polymer (MIP) nano kafein. *Jurnal Fisika* 10. Vol. (1) hh. 1-7.
- [38] Zhang, R et.al. 2018. Dielectric And Magnetic Properties Of CoFe₂O₄ Prepared By Sol-Gel Auto-Combustion Method, *Materials Research Bulletin*. 98;133-138 <https://doi.org/10.1016/j.materresbull.2017.08.006>

- [39] Munguti, L., Dejene, F. 2020. Influence of annealing temperature on structural, optical and photocatalytic properties of ZnO–TiO₂ composites for application in dye removal in water. *Nano-Structures & Nano-Objects*.
- [40] Balcha, A., Yadav, O. P., & Dey, T. 2016 Photocatalytic Degradation of Methylene Blue Dye by Zinc Oxide Nanoparticles Obtained from Precipitation and SolGel Methods, *Environ Sci Pollut Res* 23 25485-25493.
- [41] Demirci, C., Dikici, T., Tünçay, M. M., & Kaya, N. 2020. A study of heating rate effect on the photocatalytic performances of ZnO powders prepared by sol-gel route: Their kinetic and thermodynamic, *Journal Pre-proofs*
- [42] Elsayed, M. H. et.al., 2020. Direct sunlight- active Na-doped ZnO photocatalyst for the mineralization of organic pollutants at different pH mediums, *Journal of the Taiwan Institute of Chemical Engineers*, 000 hh 11
- [43] Suharyadi, E., et.al., 2020. Photocatalytic activity of magnetic core shell CoFe₂O₄/ZnO ZnO nanoparticles for methylene blue purification, *Materials Research Express* 7:085013
- [44] Suganthi, N., Thangavel, S., & Kannan, K. 2020. Hibiscus subdariffa leaf extract mediated 2-D fern-like ZnO/TiO₂ hierarchical nanoleaf for photocatalytic degradation, *FlatChem* 24 1-9.

LAMPIRAN

Lampiran 1. Analisis Data

Tabel 1. Analisis Data XRD untuk Ukuran Rata-Rata Kristal dan Regangan kisi komposit ZnO/Al₂(SO₄.

hkl	2 theta	Regangan			Ukuran kristal		
		1 jam	10 jam	15 jam	1 jam	10 jam	15 jam
100	32,4871	0,0026	0,0028	0,0028	51,84	48,84	54,15
x002	35,139	0,0021	0,0024	0,0025	58,91	52,51	69,55
101	36,9703	0,0023	0,0025	0,0025	53,03	48,65	60,48
x012	48,249	0,0020	0,0020	0,0019	46,33	46,31	79,14
x110	57,2897	0,0015	0,0016	0,0015	52,76	50,75	55,09
111	63,5323	0,0013	0,0015	0,0014	53,65	48,15	62,86
x013	66,8911	0,0012	0,0012	0,0012	55,06	56,13	52,01
112	68,6099	0,0012	0,0014	0,0015	54,98	48,08	72,78
201	69,7395	0,0012	0,0013	0,0012	54,58	50,78	66,04
Ukuran rata -rata kristal					53,46	50,02	63,57

Tabel 2. Analisis Data Uv-vis untuk presentase degradasi komposit ZnO/Al₂(SO₄)₃

Sampel	Waktu Milling	C ₀	C _t				Persentase Degradasi			
			5	10	15	20	5	10	15	20
ZnO/Al ₂ (SO ₄) ₃	1 Jam	0,0514	0,01117	0,01015	0,00996	0,00959	78,30225	80,28361	80,65268	81,37141
	10 Jam	0,0514	0,01447	0,01259	0,01056	0,00779	71,892	75,5439	79,48718	84,86791
	15 Jam	0,0514	0,01987	0,01971	0,01709	0,01397	61,40249	61,71329	66,80264	72,86325

