

DAFTAR PUSTAKA

- [1] A. Ramadhadi, Kapasitansi Adsorpsi Metilen Biru Oleh Lempung Cengar Teraktivasi Asam Sulfat, *JOM FMIPA*, 2 (2018) 232-238.
- [2] Adi Wisnu Ari, dkk. 2017. Absorption Characteristics of The Electromagnetic Wave And Magnetic Properties of The $\text{La}_{0.8}\text{Ba}_{0.2}\text{Fe}_x\text{Mn}^{1/2}(1-x)\text{Ti}^{1/2}(1-x)\text{O}_3$ ($x = 0.1-0.8$) Perovskite System, *International Journal of Technology* 5: 887-897.
- [3] D. Olga, W. Natalia, S. Krzysztof, B. Marcin, Photocatalytic properties of coating materials enriched with bentonite/ZnO/CuO nanocomposite, *Material chemistry and physics* 260 (2021) 124150.
- [4] D. Tahir, S. Ilyas, B. Abdullah, B. Armynah, HJ Kang. 2018. Sifat elektronik dari komposit besi (II, III) oksida (Fe_3HAl_4) bahan penyerap karbon dengan spektroskopi elektron, *J. Elektron. Spektrosk. Relasi. Fenomena*. 229: 47-51
- [5] Ge Yaqing, dkk. 2021. Polypyrrole/ γ - Fe_2O_3 /g-C₃N₄ Nanocomposites For High-Performance Electromagnetic Wave Absorption, *Synthetic Metals* 274: 116716.
- [6] Guo Lin, dkk. 2019. Performance Enhanced Electromagnetic Wave Absorber From Controllable Modification of Natural Plant Fiber, *The Royal Society of Chemistry* 9, 16690.
- [7] Hanh NT, Tri NLM, Thuan, DV, Tung MHT, Pham TD, Minh TD, Trang HT, Binh MT, Nguyen MV. 2019. Monocrotophos pesticide effectively removed by novel visible light driven Cu doped ZnO photocatalyst. *Journal of Photochemistry and Photobiology A: Chemistry*. 382: 111923.
- [8] He Jun, dkk. 2021. N-Doped Residual Carbon From Coal Gasification Fine Slag Decorated With Fe_3O_4 Nanoparticles For Electromagnetic Wave Absorption, *Journal of Materials Science & Technology* S1005-0302: 00708-8.

- [9] Heryanto H., Dahlang Tahir. 2021. The Correlations Between Structural and Optical Properties of Magnetite Nanoparticles Synthesised from Natural Iron Sand, *Ceramics International* 47: 16820-16827.
- [10] Heryanto, dkk. 2018. Analysis of Structural Properties of X-Ray Diffraction for Composite Copper-Activated Carbon by Modified Williamson-Hall and Size-Strain Plotting Methods, *Journal of Physics: Conference Series* 1080: 012007.
- [11] Heryanto, dkk. 2021. Effects Of Washing Method Of Nickel Slag To The Structural Properties Of Composite Nickel Slag/Laterite Soil For High Electromagnetic Wave Absorption Performance, *Journal of Physics: Conference Series* 1763: 012055.
- [12] Ishii Satoshi, dkk. 2017. Resonant Optical Absorption and Photothermal Process in High Refractive Index Germanium Nanoparticles, *Advanced Optical Materials* 5- 1600902.
- [13] J. Revathi, M.J Abel, V. Archana, T. Sumithra, R. Thiruneelakandan, J.J. Prince, Synthesis And Characterization Of Fe_2O_4 and Ni-Doped Fe_2O_4 Nanoparticles by Chemical Co-precipitation Technique for Photo-Degradation of Organic Dyestuff Under Direct Sunlight, *Physica B: Physics of Condensed Matter*. 578 (2020) 412136.
- [14] Jia Chong, dkk. 2021. $\text{Fe}_3\text{O}_4/\text{A-Fe}$ Decorated Porous Carbon-Based Composites With Adjustable Electromagnetic Wave Absorption: Impedance Matching and Loading Rate, *Journal of Alloys and Compounds* 858: 157706.
- [15] Lia Yang, dkk. 2019. ZnO Amounts-Dependent Electromagnetic Wave Absorption Capabilities Of Ni/Zno Composite Microspheres, *Journal of Materials Science: Materials in Electronics* 30:19966–19976.
- [16] Liang Hongsheng, dkk. 2020. Bamboo-Like Short Carbon Fibers@ Fe_3O_4 @Phenolic Resin and Honeycomb-Like Short Carbon Fibers@ Fe_3O_4 @Feo Composites as High-Performance

Electromagnetic Wave Absorbing Materials, *Composites Part A* 135: 105959.

- [17] Liu Jiaolong, dkk. 2020. Toward the application of electromagnetic wave absorption by two-dimension materials, *Journal of Materials Science: Materials in Electronics*.
- [18] Mulyati, Tri Anna. Fery Eko Pujiono. 2017. Preparasi Dan Karakterisasi Karbon Aktif Dari Limbah Ampas Tebu Menggunakan Aktivator KOH. *Indonesian Chemistry And Application Journal (ICAJ)* 2(1): 2549-2314.
- [19] Prasdiantika, R. dan Susanto, S. 2016. Preparasi dan Penentuan Jenis Oksida Besi Pada Material Magnetik Pasir Besi Lansilowo. *Jurnal Teknosains*, Universitas Gadjah Mada, 6(1):7-15. DOI: 10.22146/teknosains.11385.
- [20] Prasdiantika, R. dan Susanto, S. 2020. Pencucian Material Magnetik Pasir Besi Lansilowo Menggunakan Larutan Asam Klorida, *Jurnal Teknosains*, Universitas Gadjah Mada, 10(1):75-85.
- [21] Rajapaksha R. M. T. D., dkk. 2021. Enhancement of Gas Sensitivity of Ferric Oxide Thin Films by Adding Activated Carbon Nanoparticles, *Iconic Research and Engineering Journals* 4 (10): 2456-8880.
- [22] Shinde Satish Laxman, dkk. 2017. White Light Emission from Black Germanium. American Chemical Society Photonics.
- [23] Shu Xiangfeng, dkk. 2021. Acicular or Octahedral Fe₃O₄/Rice Husk-Based Activated Carbon Composites Through Graphitization Synthesis As Superior Electromagnetic Wave Absorbers, *Composites Part A* 151: 106635
- [24] Suryani S, Heryanto H, Rusdaeni R, Fahri AN dan Tahir D. 2020. *Keramik Internasional* 46 18601-18607
- [25] Tadda M.A., dkk. 2016. A Review on Activated Carbon: Process, Application and Prospects, *Journal of Advanced Civil Engineering Practice and Research* 1(2):7-13.

- [26] Udyani, Kartika dkk. 2019. Pembuatan Karbon Aktif Dari Arang Bakau Menggunakan Gabungan Aktivasi Kimia dan Fisika Dengan *Microwave*. *Jurnal IPTEK* 23 (1): 1411-7010. Hal: 39-46.
- [27] Wang Yan, dkk. 2020. MOF-Derived Nanoporous Carbon/Co/Co₃O₄/Cnts/RGO Composite With Hierarchical Structure As a High-Efficiency Electromagnetic Wave Absorber, *Journal of Alloys and Compounds* 846: 156215.
- [28] Wen Guosheng, dkk. 2019. Facile Synthesis of RGO/Co@Fe@Cu Hollow Nanospheres With Efficient Broadband Electromagnetic Wave Absorption, *Chemical Engineering Journal* 372: 1–11.
- [29] Wu Nannan, dkk. 2018. Ultrathin High-Performance Electromagnetic Wave Absorbers with Facilely Fabricated Hierarchical Porous Co/C Crabapples, *Journal of Materials Chemistry C* 1-31.
- [30] Wu Nannan, dkk. 2021. Recent Development in Fabrication of Co Nanostructures and Their Carbon Nanocomposites for Electromagnetic Wave Absorption, *Engineered Science* 13, 11–23.
- [31] B. Abdullah, S. Ilyas, D. Tahir, Nanocomposites Fe/activated carbon/PVA for Microwave Absorber: Synthesis And Characterization, *J. Nanomater.* 2018 (2018), <https://doi.org/10.1155/2018/9823263>. ID 982326.
- [32] Nandini , R., & Santanu, C. (2020). ZnO as photocatalyst: An approach to waste water treatment. *Materials Today: Proceedings*, 46 (14), 6399-6403. <http://doi.org/10.1016/j.matpr.2020.06.264>.
- [33] Sonal, S., Saurabh, D & Shukla, A.K. (2018). Self-assembly of the Ag deposited ZnO/carbon nanosphere: A resourceful photocatalyst for efficient photocatalytic degradation of methylene blue dye in water. *Advanced Powder Technology*, 12 (29), 3483-3492.
- [34] Saravanan, S. Mohana, M.K., Navaneethan, M., Ponnusamy, S., & Muthamizhchelvan, C. (2019). Synthesis and photocatalytic activity of Gd doped ZnO nanoparticles for enhanced degradation of methylene

- blue under visible light. *Materials Science in Semiconductor Processing*, 103, 104622. <https://doi.org/10.1016/j.mssp.2019.2019.104622>
- [35] Lestari, Indriana., 2017, Degradasi Senyawa Organik. Palm Oil Mill Secondary Effluent Menggunakan Fotokatalis TiO₂, *Jurnal Widya Citra Edukasi*, 9(2), 143-152.
- [36] Munasir, dkk., 2018. Phase Transition of SiO₂ Nanoparticles Prepared from Natural Sand : The Calcination Temperature Effect. *Journal of Physics Conference Series* 1093 (1): 012025. <http://dx.doi.org/10.1088/1742-6596/1093/1/012025>
- [37] J. Wang, Z. Liao, J. Ifthikar, L. Shi, Y. Du, J. Zhu, S. Xi, Z. Chen, Z. Chen, Treatment of 591 refractory contaminants by sludge-derived biochar/persulfate system via both adsorption and 592 advanced oxidation process, *Chemosphere* 185 (2017) 754-763.
- [38] G. Fang, C. Liu, J. Gao, D.D. Dionysiou, D. Zhou, Manipulation of persistent free radicals 667 in biochar to activate persulfate for contaminant degradation, *Environ. Sci. Technol.* 49(9) 668 (2015) 5645-5653.
- [39] Tabrizi Hafez Moghaddas, S.M., Elahi, B. and Javabankht, V. 2020. Biosynthesis of pure zinc oxide nanoparticles using Quince seed mucilage for photocatalytic dye degradation. *Journal of Alloys and Compound*. 821.p. 153519. doi: 10.1016/j.jallcom.2019.153519.
- [40] Maimuna, Manado, F. and Royani, I. 2020. *Jurnal Fisika Imprinted Polymer (MIP) nanokafein*. 10(1).pp 1-7.
- [41] Munasir, Dwanto AS, Kusuawati DH, Putri NP, Yulianingsih A, dan Sa'adah IKF. 2018. *IOP Conf. Ser. Matter. Sci. Eng.* 367 012010.
- [42] Bahrul, U., Sultan, I., Ahmad, N.F., Inayatul, M., Muhammad, A.A., Nurfina, Y., Eymal, B., Demmalino & Dahlang, T. (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, 30(12), 4905-4916.
<https://doi.org/10.1007/s10904-020-01631-5>

- [43] Fahmiati, Nuryono, N., and Suyanta, S. (2017). Characteristics of Iron Sand Magnetic Material from Bugel Beach, Kulon Progo, Yogyakarta. *IOP Conference Series: Materials Science and Engineering*, 172:12020. DOI: 10.1088/1757-899X/172/1/012020
- [44] Y. Sun, W. Zhong, Y.Q. Wang, X.B. Xu, T.T. Wang, L.Q. Wu, Y.W. Du, MoS₂-based mixed-dimensional van der waals heterostructures: a new platform for excellent and controllable microwave-absorption performance, *ACS Appl. Mater. Interfaces* 9 (2017) 34243–34255.
- [45] Wijaya, K., Sugiharto, E., Mudasir, M., Tahir, I., and Liawati, I. (2010). Synthesis Of Iron Oxide-Montmorillonite Composite And Study Of Its Structural Stability Againts Sulfuric Acid. *Indonesian Journal of Chemistry*, 4. DOI: 10.22146/ijc.21871.
- [46] Long, B.D.et al. (2020). Theroelectric properties of quaternary chalcogenide Cu₂ZnSnS₄ synthesized by mechanical alloying. *Powder Metallurgy*. 63(3). Pp 220-226.doi:10.1080/00325899.2020.1783103
- [47] P. Feng, J.Zhao, J. Zhang, Y.We, Y. Wang, H.Li, Y.Wang. (2017). Long Persistent Photocatalys of Magnesium Gallate Nanorodes. *Journal of Alloys and Compounds*. 695 1884-1890.
- [48] A. Kalam, A.G. Al-Sehemi, M. Assiri, G.Du, T.Ahmad, I.Ahmad, .Pannipara. 2018. Modified Solvothermal Synthesis of Cobalt Ferrite (CoFe₂O₄) Magnetic Nanoparticles Photocatalysts for Degradation of Methylene Blue with H₂O₂/Visible Light, *Result in Physics*. 8 1046-105
- [49] Naik, E.I. 2021. 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,p.100671. doi:10.1016/j.cdc.2021.100671.

LAMPIRAN

Lampiran 1. Dokumentasi Penelitian



Gambar 1. Salah satu tahap preparasi karbon aktif dengan penumbukan material menggunakan mortar.

Lampiran 1. Analisis Data

Tabel 1. Analisis data *XRD* untuk kristal Fe_3O_4 +KA dengan variasi larutan NaOH

No.	B obs. [°2Th]	B std. [°2Th]	Peak pos. [°2Th]	B struct. [°2Th]	Crystallite size [Å]	
1	0,236	0,008	30,179	0,228	275	
2	0,236	0,008	35,622	0,228	281	
3	0,472	0,008	57,165	0,464	297	
4	0,472	0,008	62,753	0,464	259	
D =					278,3	A
					27,83	nm

Tabel 2. Analisis data *XRD* untuk kristal Fe_3O_4 +KA dengan variasi larutan HCl

No.	B obs. [°2Th]	B std. [°2Th]	Peak pos. [°2Th]	B struct. [°2Th]	Crystallite size [Å]	
1	0,315	0,008	30,061	0,307	262	
2	0,472	0,008	32,844	0,464	279	
3	0,276	0,008	35,401	0,268	298	
5	0,63	0,008	56,974	0,622	185	
D =					257,1	A
					25,71	nm

Tabel 3. Analisis data *XRD* untuk kristal Fe_3O_4 +KA dengan variasi larutan NaCl

No.	B obs. [$^{\circ}2\theta$]	B std. [$^{\circ}2\theta$]	Peak pos. [$^{\circ}2\theta$]	B struct. [$^{\circ}2\theta$]	Crystallite size [\AA]	
1	0,315	0,008	30,088	0,307	261	
2	0,63	0,008	53,717	0,622	183	
3	0,63	0,008	57,156	0,622	179	
4	0,63	0,008	62,611	0,622	179	
D =					204,0	A
					20,40	nm

Tabel 4. Analisis data *UV-VIS* perentase degradasi nanokomposit Fe₃O₄+KA dengan variasi larutan menggunakan polutan pestisida.

Polutan	Variasi larutan	C ₀	C _t				Persen Degradasi (%)			
			15	30	45	60	15	30	45	60
Pestisida	HCl	0,45611 5	0,014	0,098	0,175	0,143	96,9306	78,5141 8	61,6324 7	68,6482 5
	NaCl	0,45611 5	0,01696 7	0,16937 7	0,10908 6	0,21005 2	96,2801 8	62,8652 8	76,0836 7	53,9476 2
	NaOH	0,45611 5	0,01597 9	0,17342 1	0,20071 1	0,20155 1	96,4967 5	61,9786 5	55,9955 1	55,8114 1