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DAFTAR PUSTAKA

Abdelhady, H.H., Elazab, H.A., Ewais, E.M., Saber, M., dan El-Deab, M.S., 2020, Efficient Catalytic Production of Biodiesel Using Nano-Sized Sugar Beet Agro-Industrial Waste, *Fuel*, 261.

Abdullah, R.F., Rashid, U., Hazmi, B., Ibrahim, M.L., Tsubota, T., dan Alharthi, F.A., 2022, Potential Heterogeneous Nano-Catalyst Via Integrating Hydrothermal Carbonization for Biodiesel Production Using Waste Cooking Oil, *Chemosphere*, 286, 1–16.

Afriani, F., Mustari, dan Tiandho, Y., 2018, Pengaruh Lama Pemanasan Terhadap Karakteristik Kristal Kalsium dari Limbah Cangkang Kerang, *J. EduMatSains*, 2, 189–200.

Agustiningsih, D., Kunarti, E.S., Nuryono, N., Santosa, S.J., Darussalam Mardjan, M.I., Kamiya, Y., dan Otomo, R., 2024, Novel Nickel-Immobilized-SiO_2-TiO_2 Fine Particles in The Presence of Cetyltrimethylammonium Bromide as A Catalyst for Ultrasound-Assisted-Kumada Cross-Coupling Reaction, *Heliyon*, 10, 1–19.

Ahmed, M., Ahmad, K.A., Vo, D.V.N., Yusuf, M., Haq, A., Abdullah, A., Aslam, M., Patle, D.S., Ahmad, Z., Ahmad, E., dan Athar, M., 2023, Recent Trends in Sustainable Biodiesel Production Using Heterogeneous Nanocatalysts: Function of Supports, Promoters, Synthesis Techniques, Reaction Mechanism, and Kinetics and Thermodynamic Studies, *Energy Convers. Manag.*, 280, 1–26.

Akgsornpeak, A., Witoon, T., Mungcharoen, T., dan Limtrakul, J., 2014, Development of Synthetic CaO Sorbents Via CTAB-Assisted Sol-Gel Method for CO_2 Capture at High Temperature, *Chem. Eng. J.*, 237, 189–198.

Alrafei, B., Polaert, I., Ledoux, A., dan Azzolina-Jury, F., 2020, Remarkably Stable and Efficient Ni and Ni-Co Catalysts for CO_2 Methanation, *Catal. Today*, 346, 23–33.

Amal, R. dan Usman, M., 2024, A Review of Breakthroughs in Biodiesel Production with Transition and Non-Transition Metal-Doped CaO Nano-Catalysts, *Biomass and Bioenergy*, 184, 1–16.

Awogbemi, O., Inambao, F., dan Onuh, E.I., 2020, Modification and Characterization of Chicken Eggshell for Possible Catalytic Applications, *Heliyon*, 6, 1–7.

Bagheri, S., Mohd Hir, Z.A., Termeh Yousefi, A., dan Bee Abdul Hamid, S., 2015a, Progress on Mesoporous Titanium Dioxide: Synthesis, Modification and Applications, *Microporous Mesoporous Mater.*, 218, 206–222.

Bagheri, S., Mohd Hir, Z.A., Termeh Yousefi, A., dan Bee Abdul Hamid, S., 2015b, Progress on Mesoporous Titanium Dioxide: Synthesis, Modification and Applications, *Microporous Mesoporous Mater.*, 218, 206–222.

Basumatary, S.F., Brahma, Sona, Hoque, M., Das, B.K., Selvaraj, M., Brahma, Sujata, dan Basumatary, S., 2023, Advances in CaO-Based Catalysts for Sustainable Biodiesel Synthesis, *Green Energy Resour.*, 1, 1–31.

Bharti, P., Singh, B., dan Dey, R.K., 2019, Process Optimization of Biodiesel Production Catalyzed by CaO Nanocatalyst Using Response Surface Methodology, *J. Nanostructure Chem.*, 9, 269–280.

Di Bitonto, L., Todisco, S., Gallo, V., dan Pastore, C., 2020, Urban Sewage Scum and Primary Sludge as Profitable Sources of Biodiesel and Biolubricants of New Generation, *Bioresour. Technol. Reports*, 9, 1–8.

Boonyuen, S., Smith, S.M., Malaithong, M., Prokaew, A., Cherdhirunkorn, B., dan Luengnaruemitchai, A., 2018, Biodiesel Production By a Renewable Catalyst from Calcined Turbo Jourdani (Gastropoda: Turbinidae) Shells, *J. Clean. Prod.*, 177, 925–

IMPREGNASI CaO PADA SiO2/MATERIAL MAGNETIK PASIR BESI UNTUK KATALIS REAKSI TRANSESTERIFIKASI
TRILAURIN MENJADI METIL LAURAT
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929.

Cabrera, L., Gutierrez, S., Menendez, N., Morales, M.P., dan Herrasti, P., 2008, Magnetite Nanoparticles: Electrochemical Synthesis and Characterization, *Electrochim. Acta*, 53, 3436–3441.

Chen, G., Li, Z., Wang, X., Xie, L., Qi, Q., dan Fang, W., 2014, Preparation of CTAB-Loaded Magnetic Nanospheres for Rapid Bacterial Capture and Decontamination, *Mater. Lett.*, 134, 290–294.

Chi, Y., Yuan, Q., Li, Y., Tu, J., Zhao, L., Li, N., dan Li, X., 2012, Synthesis of Fe_3O_4@SiO_2-Ag Magnetic Nanocomposite Based on Small-Sized and Highly Dispersed Silver Nanoparticles for Catalytic Reduction of 4-Nitrophenol, *J. Colloid Interface Sci.*, 383, 96–102.

Debecker, D.P., Hulea, V., dan Mutin, P.H., 2013, Mesoporous Mixed Oxide Catalysts via Non-Hydrolytic Sol-Gel: A Review, *Appl. Catal. A Gen.*, 451, 192–206.

Erchamo, Y.S., Mamo, T.T., Workneh, G.A., dan Mekonnen, Y.S., 2021, Improved Biodiesel Production from Waste Cooking Oil with Mixed Methanol–Ethanol Using Enhanced Eggshell-Derived CaO Nano Catalyst, *Sci. Rep.*, 11, 1–12.

Febrida, R., Setianto, S., Herda, E., Cahyanto, A., dan Joni, I.M., 2021, Structure and Phase Analysis of Calcium Carbonate Powder Prepared by A Simple Solution Method, *Heliyon*, 7, e08344.

Gajendiran, J., Gnanam, S., Parthasaradhi Reddy, C., Ramesh Kumar, G., Bharath Sabarish, V.C., Gokul Raj, S., Ramachandran, K., Senthil, V.P., dan Gopi, V., 2022, Synthesis and Investigation of Structural Behaviour and Optical Properties of $BiFeO_3$, $YMnO_3$ and $BiFeO_3$-$YMnO_3$ Nanostructures, *Inorg. Chem. Commun.*, 135, 1–5.

Gao, H., Zhou, Y., Sheng, X., Zhao, S., Zhang, C., dan Zhang, M., 2018, Synthesis of Core-Shell and Hollow Structured Dual-Mesoporous Silica Templated by Alkoxysilyl-Functionalized Ionic Liquids and CTAB, *Mater. Lett.*, 211, 126–129.

Gomez-Vazquez, O.M., Zubieta-Otero, L.F., Londoño-Restrepo, S.M., dan Rodriguez-Garcia, M.E., 2024, Eggshells from Agro-Industrial Waste for The Recovery of Lime, Portlandite, and Calcite Nanoparticles Through The Lime Cycle: A Circular Economic Approach, *Sustain. Chem. Environ.*, 5, 1–11.

Grini, M.I., Benbayer, C., Saidi-Besbes, S., dan Elaissari, A., 2025, Advances in Mesoporous Silica Nanoparticles as Carriers for Drug Delivery and Other Biomedical Applications, *Microporous Mesoporous Mater.*, 391, 1–30.

Guan, Q., Shang, H., Liu, J., Gu, J., Li, B., Miao, R., Chen, Q., dan Ning, P., 2016, Biodiesel from Transesterification at Low Temperature by $AlCl_3$ Catalysis in Ethanol and Carbon Dioxide as Cosolvent: Process, Mechanism and Application, *Appl. Energy*, 164, 380–386.

Guo, J., Hanif, A., Shang, J., Deka, B.J., Zhi, N., dan An, A.K., 2021, PAA@ZIF-8 Incorporated Nanofibrous Membrane for High-Efficiency PM2.5 Capture, *Chem. Eng. J.*, 405, 126584.

Hariyanto, Y.A., Mujiyanti, T., dan Nasikhah, H., 2021, Ekstraksi dan Karakterisasi CaO Berbasis Cangkang Bekicot dari Ponggok Blitar sebagai Raw Material Biokeramik, *Transmisi*, 17, 126–131.

Hidayati, N., Ariyanto, T.S., dan Septiawan, H., 2017, Transesterifikasi Minyak Goreng Bekas Menjadi Biodiesel dengan Katalis Kalsium Oksida, *Teknol. Bahan Alam*, 1, 1–5.

Hossain, M.S. dan Ahmed, S., 2023, Crystallographic Characterization of Naturally Occurring Aragonite and Calcite Phase: Rietveld Refinement, *J. Saudi Chem. Soc.*, 27, 1–9.

Hu, N., Kong, Z., He, L., Ning, P., Gu, J., Miao, R., Sun, X., Guan, Q., dan Duan, P., 2018,

UNIVERSITAS GADJAH MADA
IMPREGNASI CaO PADA SiO2/MATERIAL MAGNETIK PASIR BESI UNTUK KATALIS REAKSI TRANSESTERIFIKASI TRILAURIN MENJADI METIL LAURAT
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Effective Transesterification of Triglyceride with Sulphonated Modified SBA-15 (SBA-15-SO_3H): Screening, Process and Mechanism, *Inorganica Chim. Acta*, 482, 846–853.

Ibrahim, N.A., Rashid, U., Hazmi, B., Moser, B.R., Alharthi, F.A., Rokhum, S.L., dan Ngamcharussrivichai, C., 2022, Biodiesel Production from Waste Cooking Oil Using Magnetic Bifunctional Calcium and Iron Oxide Nanocatalysts Derived from Empty Fruit Bunch, *Fuel*, 317, 123525.

Imoisili, P.E., Ukoba, K.O., dan Jen, T.C., 2020, Green Technology Extraction and Characterisation of Silica Nanoparticles from Palm Kernel Shell Ssh Via Sol-Gel, *J. Mater. Res. Technol.*, 9, 307–313.

Jafari, A., Farjami Shayesteh, S., Salouti, M., dan Boustani, K., 2015, Effect of Annealing Temperature on Magnetic Phase Transition in Fe_3O_4 Nanoparticles, *J. Magn. Magn. Mater.*, 379, 305–312.

Jayanna, V.B., M. Kulkarni, V., K.N., K., G.C., M.P., H.S., N.P., Samuel, O.D., dan Linul, E., 2025, Sustainable Biodiesel Production from Oenothera Lamarckiana Oil using Hybrid CaO@Fe_3O_4.SiO_2 Magnetic Nanocatalyst: RSM-Driven Optimization, *Results Eng.*, 25, 1–31.

Jayaprabakar, J., Karthikeyan, A., Anand, K.V., Arunkumar, T., Anbazhaghan, N., dan Rangasamy, G., 2023, Synthesis and Characterization of Calcium Oxide Nano Particles Obtained from Biowaste and Its Combustion Characteristics in A Biodiesel Operated Compression Ignition Engine, *Fuel*, 350, 128839.

Kawashima, A., Matsubara, K., dan Honda, K., 2009, Acceleration of Catalytic Activity of Calcium Oxide for Biodiesel Production, *Bioresour. Technol.*, 100, 696–700.

Khatibi, M., Khorasheh, F., dan Larimi, A., 2021, Biodiesel production via Transesterification of Canola Oil in The Presence of Na–K Doped CaO Derived from Calcined Eggshell, *Renew. Energy*, 163, 1626–1636.

Kumar, A., Singh, V.P., dan Srivastava, A., 2022, Quality Biodiesel Via Biotransesterification from Inedible Renewable Sources, *J. Clean. Prod.*, 379, 1–31.

Lani, N.S., Ngadi, N., dan Inuwa, I.M., 2020, New Route for The Synthesis of Silica-Supported Calcium Oxide Catalyst in Biodiesel Production, *Renew. Energy*, 156, 1266–1277.

Lani, N.S., Ngadi, N., dan Taib, M.R., 2017, Parametric Study on The Transesterification Reaction by Using Cao/Silica Catalyst, *Chem. Eng. Trans.*, 56, 601–606.

Lee, S.L., Wong, Y.C., Tan, Y.P., dan Yew, S.Y., 2015, Transesterification of Palm Oil to Biodiesel by Using Waste Obtuse Horn Shell-Derived CaO Catalyst, *Energy Convers. Manag.*, 93, 282–288.

Li, C., Wei, Y., Liivat, A., Zhu, Y., dan Zhu, J., 2013, Microwave-Solvothermal Synthesis of Fe_3O_4 Magnetic Nanoparticles, *Mater. Lett.*, 107, 23–26.

Lumbasiantar, F.R., Suharyadi, E., dan Manurung, P., 2026, Pengaruh Penambahan Ag terhadap Struktur Kristal dan Sifat Optik Fe_3O_4, serta Variasi Massa Nanokomposit Fe_3O_4/Ag terhadap Karakteristik Kurva Surface Plasmon Resonance Menggunakan Metode Sintesis Hijau,14, 133–143.

Macheli, L., Malefane, M.E., dan Jewell, L.L., 2025, Waste-derived Calcium Oxide Catalysts in Biodiesel Production: Exploring Various Waste Sources, Deactivation Challenges, and Improvement Strategies, *Bioresour. Technol. Reports*, 29, 102021.

Madhu, D., Arora, R., Sahani, S., Singh, V., dan Sharma, Y.C., 2017, Synthesis of High-Quality Biodiesel Using Feedstock and Catalyst Derived from Fish Wastes, *J. Agric. Food Chem.*, 65, 2100–2109.

Maheer, U., Badsha, M.M., Joynal Abedin, F.N., Balakrishnan, V., Sohni, S., Zulkifli, M., Ramli, A., dan Hossain, M.S., 2026, Biodiesel Production from Discarded Fish Waste

UNIVERSITAS
GADJAH MADA
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Lipids Using CaO-Based Heterogeneous Catalyst: Kinetics Modeling, Process Optimization and Validation Using Artificial Neural Network, *Biomass and Bioenergy*, 211, 1–16.

Maitera, O.N., Moses, E., dan Dass, P.M., 2019, Production of Biodiesel Using Calcium Oxide (CaO) Nanoparticle Synthesized from Chicken Eggshell, *Int. J. Progress. Sci. Technol. (IJPSAT*, 16, 144–154.

Maleki, B. dan Esmaeili, H., 2023, Application of Fe_3O_4/SiO_2@ZnO Magnetic Composites as A Recyclable Heterogeneous Nanocatalyst for Biodiesel Production from Waste Cooking Oil: Response Surface Methodology, *Ceram. Int.*, 49, 11452–11463.

Maneechakr, P. dan Karnjanakom, S., 2021, Systematic Production of Biodiesel Fuel from Palm Oil over Porous K_2O@CaO Catalyst Derived from Waste Chicken Eggshell via RSM/Kinetic/Thermodynamic Studies, *J. Environ. Chem. Eng.*, 9, 106542.

Mansir, N., Teo, S.H., Rashid, U., Saiman, M.I., Tan, Y.P., Alsultan, G.A., dan Taufiq-Yap, Y.H., 2018, Modified Waste Egg Shell Derived Bifunctional Catalyst for Biodiesel Production from High FFA Waste Cooking Oil. A Review, *Renew. Sustain. Energy Rev.*, 82, 3645–3655.

Manurung, R., Parinduri, S.Z.D.M., Hasibuan, R., Tarigan, B.H., dan Siregar, A.G.A., 2023, Synthesis of Nano-CaO Catalyst with SiO_2 Matrix Based on Palm Shell Ash as Catalyst Support for One Cycle Developed in The Palm Biodiesel Process, *Case Stud. Chem. Environ. Eng.*, 7, 100345.

Manyepedza, T., Lephalale, T., dan Kabomo, M.T., 2026, Valorization of Eggshell Waste Into CaO Adsorbents for Efficient Crystal Violet Dye Removal: Kinetics, Isotherms, Thermodynamic and Activation Energy Studies, *Results Chem.*, 24, 103209.

Marinković, D.M., Stanković, M. V., Veličković, A. V., Avramović, J.M., Miladinović, M.R., Stamenković, O.O., Veljković, V.B., dan Jovanović, D.M., 2016, Calcium Oxide as A Promising Heterogeneous Catalyst for Biodiesel Production: Current State and Perspectives, *Renew. Sustain. Energy Rev.*, 56, 1387–1408.

McLean, B. dan Yarovsky, I., 2024, Structure, Properties, and Applications of Silica Nanoparticles: Recent Theoretical Modeling Advances, Challenges, and Future Directions, *Small*, 20, 1–34.

Mel'gunov, M.S., 2023, Application of The Simple Bayesian Classifier for The N_2 (77 K) Adsorption/Desorption Hysteresis Loop Recognition, *Adsorption*, 29, 199–208.

Mukminin, A., Firdaus, M., Yuniarti, Y., dan Syabani, M.W., 2019, Pengaruh Waktu Kalsinasi Cangkang Kelomang (Paguroidea) pada Suhu Tinggi dalam Pembentukan CaO Sebagai Katalis Padat, *IJCR*, 4, 1–8.

Najjar, A.A., Hassan, E.A., Zabermawi, N.M., Almasaudi, S.B., Moulay, M., Harakeh, S., dan Abd El-Aal, M., 2022, Efficacy of the Immobilized Kocuria flava Lipase on Fe_3O_4/Cellulose Nanocomposite for Biodiesel Production from Cooking Oil Wastes, *Catalysts*, 12, 1–19.

Niculescu, A.G., Chircov, C., dan Grumezescu, A.M., 2022, Magnetite Nanoparticles: Synthesis Methods – A Comparative Review, *Methods*, 199, 16–27.

Nurdina, R.., 2025, Synthesis and Characterization of Magnetic Material/SiO_2/CaO Catalyst for Tripalmitin Transesterification,.

Nurdina, R.A., 2013, Synthesis and Characterization of Magnetic Material/SiO_2/CaO Catalyst for Tripalmitin Transesterification, *Annu. Rev. Mater. Sci.*, 30, .

Ooi, H.K., Koh, X.N., Ong, H.C., Lee, H.V., Mastuli, M.S., Taufiq-Yap, Y.H., Alharthi, F.A., Alghamdi, A.A., dan Mijan, N.A., 2021, Progress on Modified Calcium Oxide Derived Waste-Shell Catalysts for Biodiesel Production, *Catalysts*, 11, 1–26.

Osman, W.N.A.W., Rosli, M.H., Mazli, W.N.A., dan Samsuri, S., 2024, Comparative Review of Biodiesel Production and Purification, *Carbon Capture Sci. Technol.*, 13,

UNIVERSITAS GADJAH MADA
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1–32.

Owens, G.J., Singh, R.K., Foroutan, F., Alqaysi, M., Han, C.M., Mahapatra, C., Kim, H.W., dan Knowles, J.C., 2016, Sol-Gel Based Materials for Biomedical Applications, *Prog. Mater. Sci.*, 77, 1–79.

Pajchel, L. dan Kolodziejski, W., 2018, Synthesis and Characterization of MCM-48/Hydroxyapatite Composites for Drug Delivery: Ibuprofen Incorporation, Location and Release Studies, *Mater. Sci. Eng. C*, 91, 734–742.

Pal, N. dan Bhaumik, A., 2013, Soft Templating Strategies for The Synthesis of Mesoporous Materials: Inorganic, Organic-Inorganic Hybrid and Purely Organic Solids, *Adv. Colloid Interface Sci.*, 189, 21–41.

Panchal, B., Su, C.H., Nguyen, M.L., Fu, C.C., Ngo, K.N., Wu, S.J., dan Juan, H.Y., 2026, Biodiesel Production Using Enzymatic Catalysts with Municipal Sewage Sludge Efficiently Reduces Greenhouse Gas and Nitrogen Oxide Emissions: A Review, *Renew. Sustain. Energy Rev.*, 237, 1–20.

Potorochenko, A.N. dan Rodygin, K.S., 2025, Calcium Waste as A Catalyst in The Transesterification for Demanding Esters: Scalability Perspective, *Beilstein J. Org. Chem.*, 21, 1520–1527.

Rahmawati, S., Alhikami, A.F., Taufiq, A., Aniza, R., Ansori, M., dan Yanuarta, A.A., 2026, Synthesis of Waste-Derived Fe_3O_4-CaO Nanomagnetic Catalysts for Efficient Biodiesel Production under Mild Operating Conditions, *Next Mater.*, 11, 1–13.

Refaat, A.A., 2011, Biodiesel Production Using Solid Metal Oxide Catalysts, *Int. J. Environ. Sci. Technol.*, 8, 203–221.

Riyanto, A., 2019, Preparasi dan Karakteristik Fisis Nanopartikel Magnetit (Fe_3O_4), *J. Fis. Flux J. Ilm. Fis. FMIPA Univ. Lambung Mangkurat*, 16, 35–41.

Sai Bharadwaj, A.V.S.L., Singh, M., Niju, S., Meera Sheriffa Begum, K.M., dan Anantharaman, N., 2019, Biodiesel Production from Rubber Seed Oil Using Calcium Oxide Derived from Eggshell as Catalyst-Optimization and Modeling Studies, *Green Process. Synth.*, 8, 430–442.

Sebos, I., 2022, Fossil Fraction of CO_2 Emissions of Biofuels, *Carbon Manag.*, 13, 154–163.

Shou, J., Jiang, C., Wang, F., Qiu, M., dan Xu, Q., 2015, Fabrication of Fe_3O_4/MgAl-Layered Double Hydroxide Magnetic Composites for The Effective Decontamination of Co(II) from Synthetic Wastewater, *J. Mol. Liq.*, 207, 216–223.

Sufe, G., 2026, The Decline of Fossil Fuels and The Search for Viable Alternatives: A Critical Review of Biodiesel, Electric, and Biogas Energy Systems under Global Socio-Political and Technical Constraints, *Appl. Energy*, 412, 1–35.

Sun, G., Li, Y., Cai, Z., Teng, Y., Wang, Y., dan Reaney, M.J.T., 2017, K_2CO_3-Loaded Hydrotalcite: A Promising Heterogeneous Solid Base Catalyst for Biolubricant Base Oil Production from Waste Cooking Oils, *Appl. Catal. B Environ.*, 209, 118–127.

Supriyanto, N.S.W., Sukarni, Puspitasari, P., dan Permanasari, A.A., 2019, Synthesis and Characterization of CaO/$CaCO_3$ from Quail Eggshell Waste by Solid State Reaction Process, *AIP Conf. Proc.*, 2120, 1–6.

Taufiq, A., Nikmah, A., Hidayat, A., Sunaryono, S., Mufti, N., Hidayat, N., dan Susanto, H., 2020, Synthesis of Magnetite/Silica Nanocomposites from Natural Sand to Create A Drug Delivery Vehicle, *Heliyon*, 6, .

Teo, S.H., Islam, A., Chan, E.S., Thomas Choong, S.Y., Alharthi, N.H., Taufiq-Yap, Y.H., dan Awual, M.R., 2019, Efficient Biodiesel Production from Jatropha Curcus Using $CaSO_4$/Fe_2O_3-SiO_2 Core-Shell Magnetic Nanoparticles, *J. Clean. Prod.*, 208, 816–826.

Tigro, A.A., Hailegiorgis, S.M., dan Reshad, A.S., 2025, Heterogeneous Alkaline Calcium

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IMPREGNASI CaO PADA SiO2/MATERIAL MAGNETIK PASIR BESI UNTUK KATALIS REAKSI TRANSESTERIFIKASI TRILAURIN MENJADI METIL LAURAT
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Oxide Nano-Catalyst Supported on Porous Materials for The Transesterification Reaction: A Review, *Results Eng.*, 27, 105912.

Torkzaban, S., Feyzi, M., dan Norouzi, L., 2022, A Novel Robust CaO/ZnFe2O4 Hollow Magnetic Microspheres Heterogenous Catalyst for Synthesis Biodiesel from Waste Frying Sunflower Oil, *Renew. Energy*, 200, 996–1007.

Vazquez, N.I., Gonzalez, Z., Ferrari, B., dan Castro, Y., 2017, Synthesis of Mesoporous Silica Nanoparticles by Sol-Gel as Nanocontainer for Future Drug Delivery Applications, *Bol. la Soc. Esp. Ceram. y Vidr.*, 56, 139–145.

Veerasingam, S. dan Venkatachalapathy, R., 2014, Estimation of Carbonate Concentration and Characterization of Marine Sediments by Fourier Transform Infrared Spectroscopy, *Infrared Phys. Technol.*, 66, 136–140.

Wei, Y., Yang, W., dan Yang, Z., 2022, An Excellent Universal Catalyst Support-Mesoporous Silica: Preparation, Modification and Applications in Energy-Related Reactions, *Int. J. Hydrogen Energy*, 47, 9537–9565.

Widayat, Putra, D.A., dan Nursafitri, I., 2019, Synthesis and Catalytic Evaluation of Hematite (α-Fe_2O_3) Magnetic Nanoparticles from Iron Sand for Waste Cooking Oil Conversion to Produce Biodiesel Through Esterification-Transesterification Method, *IOP Conf. Ser. Mater. Sci. Eng.*, 509, .

Widayat, Satriadi, H., Setyojati, P.W., Shihab, D., Buchori, L., Hadiyanto, H., dan Nurushofa, F.A., 2024, Preparation CaO/MgO/Fe_3O_4 Magnetite Catalyst and Catalytic Test for Biodiesel Production, *Results Eng.*, 22, 1–7.

Xia, S., Tao, J., Zhao, Y., Men, Y., Chen, C., Hu, Y., Zhu, G., Chu, Y., Yan, B., dan Chen, G., 2024, Application of Waste Derived Magnetic Acid-Base Bifunctional CoFe/Biochar/CaO as An Efficient Catalyst for Biodiesel Production from Waste Cooking Oil, *Chemosphere*, 350, 1–10.

Yokoi, T., Kubota, Y., dan Tatsumi, T., 2012, Amino-Functionalized Mesoporous Silica as Base Catalyst and Adsorbent, *Appl. Catal. A Gen.*, 421, 14–37.

Yuvarajan, D., Dinesh Babu, M., BeemKumar, N., dan Amith Kishore, P., 2018, Experimental Investigation on The Influence of Iitanium Dioxide Nanofluid on Emission Pattern of Biodiesel in A Ddiesel Engine, *Atmos. Pollut. Res.*, 9, 47–52.

Zarabadipour, M., Soleimani, M., dan Ghahraman Afshar, M., 2025, Application of Functionalized Fe_3O_4@SiO_2 Nanoparticles as An Adsorbent for Heavy Metal Removal, *Results Chem.*, 17, 102514.

Zhu, H., Wu, Z., Chen, Y., Zhang, P., Duan, S., Liu, X., dan Mao, Z., 2006, Preparation of Biodiesel Catalyzed by Solid Super Base of Calcium Oxide and Its Refining Process, *Chinese J. Catal.*, 27, 391–396.