UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

REFERENCES

Aamaas, B., Lund, M.T., Fuglestvedt, J.S., Totterdill, A., Owen, B., Skowron, A., and Lee, D.S., 2025, Continued global warming from aviation even under high-ambition mitigation scenarios, *One Earth*, 8, 101270, 2.

Admi, Ramadhani, F., dan Syukri, 2020, View of Sintesis dan Karakterisasi Enkapsulat Katalis Nikel (II) pada Silika Mesopori Modifikasi, *Jurnal Riset Kimia*, 11(2), 93–101.

Ahmad, S., Nazir, M.S., Ali, Z., Akhtar, M.N., Hussein, H.A., and Abdullah, M.A., 2021, *Green Sustainable Process for Chemical and Environmental Engineering and Science: Plant-Derived Green Solvents: Properties and Applications*, Elsevier, London, 229–251

Akar, P.G., 2025, The impact of air transportation on economic growth: Novel findings from the CS-ARDL model, *Transp. Policy.*, 173, 104184

Alshuiael, S.M. and Al-Ghouti, M.A., 2020, Multivariate analysis for FTIR in understanding treatment of used cooking oil using activated carbon prepared from olive stone, *PLoS One*, 15(5), e0233126.

Alslaibi, T.M., Abustan, I., Ahmad, M.A., and Foul, A.A., 2013, A review: production of activated carbon from agricultural byproducts via conventional and microwave heating, *J. Chem. Technol. Biotechnol.*, 88(7), 1183–1190.

Amous, J.M., 2018, Deposits Effects on Catalysts Porous Structure and Chemical Activity during Residuum Catalytic Hydro-treatment, *Univ. J. Eng. Sci.*, 6(1), 12–18.

Ardini, M.A., Triyono, Hara, T., Ichikuni, N., and Trisunaryanti, W., 2025, Study of metal sequenced spray impregnation method towards Co-Mo/γ-Al_2O_3 catalytic performance in hydrotreating of used coconut oil to liquid biohydrocarbon, *Microporous and Mesoporous Mater.*, 382, 113357.

Arshad, A., Akram, H., Ullah, H., Andleeb, S., Shafiq, M., Ul-Haq, Z., Khan, R., Bahadar, A., Mahmood, A., and Iqbal, M., 2025, L-Glycine and L-leucine derived multifunctional ionic liquids for potential antibacterial applications: *in-vitro* and *in-silico* studies, *BMC Chem.*, 19, 45.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Ashokkumar, M., 2011, The characterization of acoustic cavitation bubbles – An overview, *Ultrason. Sonochem.*, 18(4), 864–872.

Asnawati, D., Saviola, A.J., Wijaya, K., Kartini, I., Purwono, S., Rodiansono, R., Mara, A., Oh, W.C., Kristiani, A., Sudiyarmanto, S., and Trisunaryanti, W., 2025, Toward Efficient Bio-jet Fuel Production via Atmospheric Hydrotreating: Insight into the Effect of Co/HZSM-5, Mo/HZSM-5, and CoMo/HZSM-5 Catalyst Arrangements, *Arab. J. Sci. Eng.* 50, 21123–21144.

Balogun, S.A., Hermansyah, D., Ghazali, I., Teknologi, F., Mekanikal, K., Pembuatan, D., Amanah, A., Mohammed, A.T., and Kurnia, M.T., 2022, Renewable Aviation Fuel: Review of Bio-jet Fuel for Aviation Industry. *Eng. Sci. Let.*, 1(01), 7–11.

Bawane, R.K., Muthuraja, A., Shelke, G.N., and Choudhary, C., 2020, Impact analysis of emulsified *Calophyllum oil* biodiesel B100-WIC and B50-WIC on performance and emission characteristic of a diesel engine under variation in compression ratio, *Fuel*, 280, 118611.

Bedia, J., Belver, C., Ponce, S., Rodriguez, J., and Rodriguez, J.J., 2018, Adsorption of antipyrine by activated carbons from FeCl3-activation of Tara gum, *Chem. Eng. J.*, 333, 58–65.

Benavides, A., Benjumea, P., Cortés, F.B., and Ruiz, M.A., 2021, Chemical composition and low-temperature fluidity properties of jet fuels, *Processes*, 9(6), 1014.

Bhuiya, M.M.K., Rasul, M.G., Khan, M.M.K., Ashwath, N., Azad, A.K., and Hazrat, M.A., 2014, Second generation biodiesel: Potential alternative to-edible oil-derived biodiesel. In, *Energy Procedia*. Elsevier Ltd, pp. 1969–1972.

Bozkurt, O.D., Okonsky, S.T., Alexopoulos, K., and Toraman, H.E., 2022, Catalytic conversion of SPW and products upgrading, *Adv. Chem. Eng.*, 60, 117–168.

Charmas, B., Zięzio, M., and Jedynak, K., 2023, Assessment of the Porous Structure and Surface Chemistry of Activated Biocarbons Used for Methylene Blue Adsorption, *Molecules*, 28(17), 6184.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Chatel, G., 2021, Sonochemistry in nanocatalysis: The use of ultrasound from the catalyst synthesis to the catalytic reaction, *Nanomaterials*, 11(10), 2472.

Chen, B., Bao, S., Zhang, Y., and Zheng, R., 2018, Ultrasound-assisted synthesis of N235- impregnated resins for vanadium (V) adsorption, *R. Soc. Open Sci.*, 5, 180658

Chen, J.P., Wu, S., and Chong, K.H., 2003, Surface modification of a granular activated carbon by citric acid for enhancement of copper adsorption, *Carbon*, 41, 1979–1986.

Chen, L., Janssens, T.V.W., Skoglundh, M., and Grönbeck, H., 2019, Interpretation of NH 3 -TPD Profiles from Cu-CHA Using First-Principles Calculations, *Top. Catal.*, 62, 93–99.

Chen, X., Zhang, D., Guo, Y., Lin, X., and Cai, H., 2022, From wood plastic composite waste to high-value aromatics via catalytic pyrolysis over an activated carbon, *J. Anal. Appl. Pyrolysis*, 167, 105688.

Chèze, B., Gastineau, P., and Chevallier, J., 2011, Forecasting world and regional aviation jet fuel demands to the mid-term (2025), *Energy Policy*, 39(9), 5147–5158.

Choudhary, P., Pandey, V.K., and Pathak, A., 2025, Process innovations in catalytic pyrolysis of lignocellulosic biomass for sustainable conversion: A review on economical approach, *Biomass Bioenergy*, 201, 108073.

Choudhry, Q., Fan, M., Khan, Z., Li, B., Zhang, S., Anwar, Z., and Rashid, M., 2025, Distinct impact of oxidation reactions on the evolution of pore structures during H3PO4 activation of aliphatic-rich poplar and aromatic-rich lignin, *Biomass Bioenergy*, 202, 108109.

Csiszár, E., Herceg, I., and Fekete, E., 2023, Effect of Heating and Citric Acid on the Performance of Cellulose Nanocrystal Thin Films, *Polymers (Basel).*, 15(18), 3755.

De, S., and Luque, R., 2014, Upgrading of waste oils into transportation fuels using hydrotreating technologies. In *Catalytic Process Development for Renewable Materials,* Wiley-VCH, Weinheim, 133-154

Demetriou, C., and Tzeli, D., 2025, Electronic Structure of the Ground and Low-Lying States of MoLi, *Molecules*, 30(12), 2874.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Deraz, N.M., 2018, Sintering process and catalysis, *Int. J. Nanomater. Nanotechnol. Nanomed*, 4, 001–003.

Ding, S., Li, F., Li, Z., Yu, H., Song, C., Xiong, D., and Lin, H., 2021, Catalytic hydrodeoxygenation of waste cooking oil and stearic acid over reduced nickel-based catalysts, *Catal. Commun.*, 149, 106235.

Dionizio, D.G.B., Forrer, L., Berhault, G., de Souza, P.M., and Henriques, C.A., 2023, Enhancement of hydrodeoxygenation catalytic performance through the addition of copper to molybdenum oxide-based catalysts, *Mol. Catal*, 536, 112915.

Doke, K.M., Khan, E.M., Doke, K.M., and Khan, E.M., 2017, Equilibrium, kinetic and diffusion mechanism of Cr(VI) adsorption onto activated carbon derived from wood apple shell, *Arab. J. Chem.*, 10, S252–S260.

Dong, S.T., Yang, P., and Yang, Q., 2024, Study on the Effect of Structure and Acidity of Hydrocracking Catalyst Support on the Selectivity of Middle Distillate, *ACS Omega*, 9, 49259–49271.

Düngen, P., Schlögl, R., and Heumann, S., 2018, Non-linear thermogravimetric mass spectrometry of carbon materials providing direct speciation separation of oxygen functional groups, *Carbon*, 130, 614–622.

Efiyanti, L., Wati, S.A., dan Maslahat, M., 2020, Pembuatan dan Analisis Karbon Aktif dari Cangkang Buah Karet dengan Proses Kimia dan Fisika Manufacture and Analysis of Activated Carbon from Rubber Fruit Shell with Chemical and Physical Processing, *Jurnal Penelitian Hasil Hutan*, 38(3), 187–200.

Ehinger, C., Pollitt, S., De Jesus Silva, J., Zhou, X., Sakamoto, K., Nachtegaal, M., Safonova, O., and Coperet, C., 2025, alloyed molybdenum enables efficient alcohol hydrodeoxygenation with supported bimetallic catalysts, *Chem. Sci.*, 16, 5887–5896.

Farma, R., and Wahyuni, F., 2019, Physical Properties Analysis of Activated Carbon from Oil Palm Empty Fruit Bunch Fiber on Methylene Blue Adsorption, *J. Technomater. Phys.*, 1, 1–8.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Feng, P., Li, J., Wang, H., and Xu, Z., 2020, Biomass-based activated carbon and activators: Preparation of activated carbon from corncob by chemical activation with biomass pyrolysis liquids, *ACS Omega*, 5, 24064–24072.

Galhardo, T.S., Gonçalves, M., Mandelli, D., and Carvalho, W.A., 2018, Glycerol valorization by base-free oxidation with air using platinum–nickel nanoparticles supported on activated carbon as catalyst prepared by a simple microwave polyol method, *Clean Technol. Environ. Policy*, 20, 2075–2088

Gao, K., Rao, J., and Chen, B., 2024, Plant protein solubility: A challenge or insurmountable obstacle, *Adv. Colloid Interface Sci.*, 324, 103074.

Gholizadeh, M., Gunawan, R., Hu, X., De Miguel Mercader, F., Westerhof, R., Chaitwat, W., Hasan, M.M., Mourant, D., and Li, C.Z., 2016, Effects of temperature on the hydrotreatment behaviour of pyrolysis bio-oil and coke formation in a continuous hydrotreatment reactor, *Fuel Process. Technol.*, 148, 175–183.

Gökçeli, G., Bozoğlu, S., and Karatepe, N., 2023, Cobalt-molybdenum bimetallic catalyst effect on biomass-derived graphitic carbon, *J. Anal. Appl. Pyrolysis*, 174, 106152.

Govindasamy, M., Ezhumalai, M., Munimathan, A., Dixit, S., Singh, S., and Dhairiyasamy, R., 2025, Lemongrass oil as a renewable additive for enhancing the oxidation and thermal properties of *calophyllum inophyllum* biodiesel, *Results Eng.*, 26, 105102.

Guo, M., Liu, Q., Du, J., Feng, F., Chen, Y., and Zhang, A., 2025, Pt-Sn/SAPO-11: A preferred high-performance, stable, and regenerable hydrogenation catalyst for Jatropha oil, *Fuel Process. Technol*, 276, 108296.

Gupta, S., Fernandes, R., Patel, R., Spreitzer, M., and Patel, N., 2023, A review of cobalt-based catalysts for sustainable energy and environmental applications, *Appl. Catal. A Gen.*, 661, 119253

Han, Y., Gholizadeh, M., Tran, C.C., Kaliaguine, S., Li, C.Z., Olarte, M., and Garcia-Perez, M., 2019, Hydrotreatment of pyrolysis bio-oil: A review, *Fuel Process. Technol*, 195, 106140.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Hancsók, J., Visnyei, O., Sági, D., and Hollo, A., 2018, Bio-Paraffin mixture production from waste fatty acid mixture, *Chem. Eng. Trans.*, 65, 373–378.

Hanif, M., Bhatti, I.A., Zahid, M., and Shahid, M., 2022, Production of biodiesel from non-edible feedstocks using environment friendly nano-magnetic Fe/SnO catalyst, *Sci. Rep.*, 12, 10641.

Hassan, S.H., Attia, N.K., El Diwani, G.I., Amin, S.K., Ettouney, R.S., and El-Rifai, M.A., 2023, Catalytic hydrocracking of jatropha oil over natural clay for bio-jet fuel production, *Sci. Rep.*, 13, 13419.

Hieu, N.H., and Thuy, T.T.M., 2016, Chemical composition analysis and antibacterial-antiinflammatoryactivity tests of tamanu seed oil extracted by supercritcial fluid technology, *Sci. Technol. Dev. J.*, 19, 146–154.

Hindarso, H., Ayucitra, A., Dewi, D.R.S., and Asri, N.P., 2024, Biodiesel Synthesis from Calophyllum Inophyllum Utilizing Modified Zeolite and Bentonite Catalysts, *Ann. Chim. Sci. Mater.*, 48, 623–638.

Hongloi, N., Jahromi, H., Rahman, T., and Adhikari, S., 2025, Pyrolysis oil upgrading via hydrotreatment to produce alternative fuel using ZrO2-supported catalysts and isopropanol as a solvent, *J. Anal. Appl. Pyrolysis*, 192, 107293.

Hossain, M.M., Ahasan, M.R., and Wang, R., 2025, Exploring the versatile roles of microwave energy in catalyst synthesis, treatment, and catalytic performance, *Fuel*, 400, 135684.

Hossain, M.Z., Chowdhury, M.B.I., Jhawar, A.K., Xu, W.Z., Biesinger, M.C., and Charpentier, P.A., 2018, Continuous Hydrothermal Decarboxylation of Fatty Acids and Their Derivatives into Liquid Hydrocarbons Using Mo/Al_2O_3 Catalyst, *ACS Omega*, 3, 7046–7060.

Hu, P., Yang, F.F., Yang, F., Zhu, F., Luo, J., Chen, X., Li, W., Bian, J., Gao, L., Wang, K., and Yin, Z., 2025, Bimetallic organic framework derived Co-MoxN/Mo2C catalyst for HER/OER bifunctional electrocatalytic reaction, *J. Colloid Interface Sci.*, 680, 427–436.

Huang, Y., Wang, L., Chao, Y., Nawawi, D.S., Akiyama, T., Yokoyama, T., and Matsumoto, Y., 2012, Analysis of lignin aromatic structure in wood based on the IR spectrum, *J. Wood Chem. Technol.*, 32, 294–303.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR
MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Huang, Y., Zhao, C., Liang, S., Wu, Z., Peng, D., Li, Y., and Liu, Y., 2025, Citric acid modified red mud for valorization as a sustainable catalyst in bisulfite-activated congo red degradation, *Sci. Rep.*, 15, 5569

Immer, J.G., Kelly, M.J., and Lamb, H.H., 2010, Catalytic reaction pathways in liquid-phase deoxygenation of C18 free fatty acids, *Appl. Catal. A Gen.*, 375, 134–139.

Irwan, Y., Hurahman, A.P., and Amanullah, M.N., 2025, Utilization of corn cob waste as composite board (fiberboard) which will be used as soundproof walls. *J. Tek. Mesin*, 14, 137.

Istadi, I., Riyanto, T., Anggoro, D.D., Pramana, C.S., and Ramadhani, A.R., 2023. High Acidity and Low Carbon-Coke Formation Affinity of Co-Ni/ZSM-5 Catalyst for Renewable Liquid Fuels Production through Simultaneous Cracking-Deoxygenation of Palm Oil. *Bull. Chem. React. Eng. Catal.*, 18, 222–237.

Iwanow, M., Gärtner, T., Sieber, V., and König, B., 2020, Activated carbon as catalyst support: Precursors, preparation, modification and characterization, *Beilstein J. Org. Chem.*, 16, 1188–1202.

Jain, M., Chandrakant, U., Orsat, V., and Raghavan, V., 2018, A review on assessment of biodiesel production methodologies from *Calophyllum inophyllum* seed oil, *Ind. Crops Prod.*, 114, 28–44.

Jiang, Y., Xiong, L., Li, W., and Yuan, L., 2026, Ultrafine and highly dispersed PdO catalyst prepared by strong electrostatic adsorption for efficient lean methane combustion, *Appl. Surf. Sci.*, 718, 164777.

Jideani, T., Seroka, N.S., and Khotseng, L., 2025, Advancements in Catalyst Design for Biomass-Derived Bio-Oil Upgrading to Sustainable Biojet Fuel: A Comprehensive Review. *ChemistryOpen*, 14, e202400123.

Jimeńez-García, G., De Lasa, H., Quintana-Solorźano, R., and Maya-Yescas, R., 2013, Catalyst activity decay due to pore blockage during catalytic cracking of hydrocarbons, *Fuel*, 110, 89–98.

Karthika, V., Badrinathan Sridharan, Nam, J.W., Kim, D., and Gyun Lim, H., 2024, Neuromodulation by nanozymes and ultrasound during Alzheimer's disease management, *J. Nanobiotechnology*, 22, 451.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Kepp, K.P., 2016, A Quantitative Scale of Oxophilicity and Thiophilicity, *Inorg. Chem.*, 55, 9461–9470.

Kishibayev, K., Dziejarski, B., Tokpayev, R., Khavaza, T., Ibraimov, Z., Yergeshov, M., Nauryzbayev, M., Nazzal, J.S., and Serafin, J., 2026, Production of activated carbons from corn cobs waste by steam or H_3PO_4 activation for effective CO_2 capture and industrial gas selectivity towards $CO_2/CH_4/N_2$, *Fuel*, 404, 136266.

Kostryukov, S.G., Matyakubov, H.B., Masterova, Y.Y., Kozlov, A.S., Pryanichnikova, M.K., Pynenkov, A.A., and Khluchina, N.A., 2023, Determination of Lignin, Cellulose, and Hemicellulose in Plant Materials by FTIR Spectroscopy, *J. Anal. Chem.*, 78, 718–727.

Kundu, D., Samanta, P., Bhowmick, S., Panigrahi, S., Dey, S., Nath, K., Rajak, R.C., Sherpa, K.C., Barathi, A., Kofoed, M.V.W., Kumar, S., and Ki Lin, C.S., 2024, Heterogeneous catalysts for sustainable biofuel production: A paradigm shift towards renewable energy, *Biocatal. Agric. Biotechnol.*, 62, 103432.

Lahijani, P., Mohammadi, M., Mohamed, A.R., Ismail, F., Lee, K.T., and Amini, G., 2022, Upgrading biomass-derived pyrolysis bio-oil to bio-jet fuel through catalytic cracking and hydrodeoxygenation: A review of recent progress, *Energy Convers. Manag.*, 268, 115956.

Leksono, B., Windyarini, E., Hasnah, T.M., Saijo, Fahruni, Maimunah, S., Artati, Y., and Baral, H., 2021, Tamanu (*Calophyllum inophyllum*) growth performance on different types of degraded peatlands in Central Kalimantan. In: *IOP Conference Series: Earth Environ. Sci.*, 914(1), 012009.

Lestari, D., Masriah, I., Yesya, A., Hasibuan, P., and Pratiwi, P.B., 2026, FTIR Analysis of ZnO-Functionalized Activated Carbon Derived from Oil Palm Empty Fruit Bunches for Potential Photocatalytic Applications, *J. Bio Geo Mater. Energy*, 1(1), 12–20

Li, H., Zhao, Z., Xiouras, C., Stefanidis, G.D., Li, X., and Gao, X., 2019, Fundamentals and applications of microwave heating to chemicals separation processes, *Renew. Sustain. Energy Rev.*, 114, 109316.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Li, J., Wang, L., and Cao, D., 2024, Investigation on spectroscopy characteristics of different metamorphic degrees of coal-based graphite, *Front. Earth Sci. (Lausanne).*, 12, 1345678.

Lim, J.H.K., Gan, Y.Y., Ong, H.C., Lau, B.F., Chen, W.H., Chong, C.T., Ling, T.C., and Klemeš, J.J., 2021, Utilization of microalgae for bio-jet fuel production in the aviation sector: Challenges and perspective, *Renewable and Sustainable Energy Reviews*, 149, 111379.

Lin, C.H., Chen, Y.K., and Wang, W.C., 2020, The production of bio-jet fuel from palm oil derived alkanes, *Fuel*, 260, 116344.

Liu, K., Cao, Y., Yang, S., Wu, C., Zhang, Z., Zhang, Q., and Zhang, H., 2020, Molybdenum Carbide-Promoted Cobalt as an Efficient Catalyst for Selective Hydrogenation, *Ind. Eng. Chem. Res.*, 59, 14267–14277.

Liu, L., Liu, B., Nakagawa, Y., Liu, S., Wang, L., Yabushita, M., and Tomishige, K., 2024, Recent progress on bimetallic catalysts for the production of fuels and chemicals from biomass and plastics by hydrodeoxygenation, *Chin. J. Catal*, 62, 1–31.

Louyot, P., Neagoe, C., Galli, F., Pirola, C., Patience, G.S., and Boffito, D.C., 2018, Ultrasound-assisted impregnation for high temperature Fischer-Tropsch catalysts, *Ultrason. Sonochem.*, 48, 523–531.

Lua, A.C., 2020, A detailed study of pyrolysis conditions on the production of steam-activated carbon derived from oil-palm shell and its application in phenol adsorption, *Biomass Convers. Biorefin.*, 10, 1–11.

Maheswari, N. and Muralidharan, G., 2017, Controlled synthesis of nanostructured molybdenum oxide electrodes for high performance supercapacitor devices, *Appl. Surf. Sci.*, 416, 461–469.

Mansur, D. and Aminuddin, 2020, Chemical conversion of Calophyllum inophyllum oil into bio-hydrocarbons fuel over presulfided NiMo/Al2O3 catalyst, *Int. J. Energy Res.*, 44, 7746–7760.

Mansy, A.E., Daniel, S., Fonzeu Monguen, C.K., Wang, H., Osman, A.I., and Tian, Z.Y., 2025, Catalytic production of aviation jet biofuels from biomass: a review, *Environ. Chem. Lett.*, 23, 419–461.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Meftahi, A., Khajavi, R., Rashidi, A., Rahimi, M.K., and Bahador, A., 2018, Preventing the collapse of 3D bacterial cellulose network via citric acid, *J. Nanostruct. Chem.*, 8, 311–320.

Meziani, A., Verloy, S., Ferroukhi, O., Roca, S., Curat, A., Tisse, S., Peulon-Agasse, V., Gardeniers, H., Desmet, G., and Cardinael, P., 2022, Evaluation of Gas Chromatography Columns with Radially Elongated Pillars as Second-Dimension Columns in Comprehensive Two-Dimensional Gas Chromatography, *Anal. Chem.*, 94, 14126–14134.

Miró i Rovira, A., Skjæveland, J., Rajendran, K., Bergh, T., Tingelstad, P., Myrstad, R., and Chen, D., 2025, Influence of Metal-Support Interaction on Anisole Hydrodeoxygenation Activity on Noble Metal TiO_2-Based Catalysts, *Top. Catal.*, 68, 2549–2564.

Mirzayanti, Y.W., Ningsih, E., Lillahulhaq, Z., Ma, Z., Renova, C., dan Wijaya, Y., 2020. Pemanfaatan Tempurung Kelapa sebagai Katalis pada Proses Konversi Minyak Curah Menjadi Biodiesel. *J. Res. Technol.*, VI, 173–183.

Mishra, P.K., Ram, A., Subedi, N.P., Jha, D., and Gautam, M., 2025, Adsorption and porosity study of Acacia catechu seed derived activated carbon, *Rajarshi Janak Univ. Res. J.*, 3, 15–23.

Mishra, R.K., Singh, B., and Acharya, B., 2024. A comprehensive review on activated carbon from pyrolysis of lignocellulosic biomass: An application for energy and the environment. *Carbon Resour. Convers.*, 7, 100228.

Mohiuddin, E., Mdleleni, M.M., and Key, D., 2018, Catalytic cracking of naphtha: The effect of Fe and Cr impregnated ZSM-5 on olefin selectivity, *Appl. Petrochem. Res.*, 8, 119–129.

Monteiro, R.R.C., Dos Santos, I.A., Arcanjo, M.R.A., Cavalcante, C.L., de Luna, F.M.T., Fernandez-Lafuente, R., and Vieira, R.S., 2022, Production of Jet Biofuels by Catalytic Hydroprocessing of Esters and Fatty Acids: A Review, *Catalysts*, 12, 311.

Moonsrikaew, W., Akkarawatkhoosith, N., Tongtummachat, T., Kaewchada, A., Lin, K.Y.A., Evgeny, R., and Jaree, A., 2023, Bio-jet fuel production from crude palm kernel oil under hydrogen-nitrogen atmosphere in a fixed-bed reactor by using Pt/C as catalyst, *Energy Convers. Manag: X*, 20, 100471.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Naat, J.N., Hakim, M.L., Yuanita, I.A., Nuryono, N., Hambali, E., Sakti, S.C.W., Fahmi, M.Z., and Permana, Y., 2026, Hydrophobic modification of silica-coated magnetic iron sand with MTES, PTES, and HDTMS for enhanced adsorption of benzene, toluene, and xylene, *Next Mater*, 10, 101461.

Nachippan, Murugu.N., Padmanabhan, S., Yuvarajan, D., Munuswamy, D.B., Sathiyamurthy, S., and Selvam, C.D., 2024, Graphene-enhanced sustainable fuel from Calophyllum inophyllum for premixed charge compression ignition engines: Advancing circular economy and emission reduction, *Results Eng.*, 24, 103096.

Naji, S.Z. and Tye, C.T., 2022, A review of the synthesis of activated carbon for biodiesel production: Precursor, preparation, and modification, *Energy Convers. Manag. X*, 13, 100152.

Nandiyanto, A.B.D., Oktiani, R., and Ragadhita, R., 2019, How to read and interpret ftir spectroscope of organic material, *Indones. J. Sci. Technol.*, 4, 97–118.

Nugroho, A., Candra Dewi, P.D., Sudiyarmanto, Hidayati, L.N., Kristiani, A., Aulia, F., Bakti, A.N., Prasetyo, J., Rinaldi, N., and Dahnum, D., 2026, Catalytic deoxygenation of coconut oil to bio-jet fuel range hydrocarbon over nickel on ZIF-67-derived metal oxide, *Fuel*, 407, 137430.

Nurlilasari, P., Attallah, N.M., and Masri, A., 2025, Transforming Corn Stalks into Sustainable Block Boards for Durable Children's Toys: A Material Science Perspective Linked to Sustainable Development Goals, *Indones. J. Econ. Bus. Account. Manage. (IJEBAM)*, 3, 11–21.

Nurmalasari, N., 2017, Sintesis Katalis NiMo secara Sequential Deposition dan Codeposition pada Silika Mesopori Tercetak Gelatin, *Chemica*, 18, 1–9.

Osorio-González, C.S., Gómez-Falcon, N., Sandoval-Salas, F., Saini, R., Brar, S.K., and Ramírez, A.A., 2020, Production of biodiesel from castor oil: A review, *Energies*, 13, 2311.

Oyekunle, D.T., Gendy, E.A., Barasa, M., Oyekunle, D.O., Oni, B., and Tiong, S.K., 2024, Review on utilization of rubber seed oil for biodiesel production: Oil extraction, biodiesel conversion, merits, and challenges, *Clean. Eng. Technol.*, 21, 100773.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Pan, Z., Wang, R., Li, M., Chu, Y., and Chen, J., 2015, Deoxygenation of methyl laurate to hydrocarbons on silica-supported Ni-Mo phosphides: Effect of calcination temperatures of precursor, *J. Energy Chem.*, 24, 77–86.

Pereira, L., Martín-Lara, M.Á., Garcia-Garcia, G., Calvo, C., Robledo, T., Solís, R.R., and Calero, M., 2025, Plastic Waste to Carbon Adsorbent: Activation with Sodium Carbonate and Functionalization with Citric Acid, *App. Sci.*, 15, 412.

Pertiwi, I., Abdullah, P., Rahayu, D.U.C., and Krisnandi, Y.K., 2021, Synthesis and characterization of nickel immobilized on aminated Periodic Mesoporous Organosilica, *AIP Conf. Proc.*, 2370, 020015.

Pimenta, J.L.C.W., de Oliveira Camargo, M., Belo Duarte, R., dos Santos, O.A.A., and de Matos Jorge, L.M., 2021, Deoxygenation of vegetable oils for the production of renewable diesel: Improved aerogel based catalysts, *Fuel*, 290, 119979.

Prajapati, R., Kohli, K., and Maity, S.K., 2022, Role of catalyst defect sites towards product selectivity in the upgrading of vacuum residue, *Fuel*, 314, 123062.

Pratama, F.U., Rahmawati, W., Wisnu, F.K., dan Suharyatun, S., 2023, Pemanfaatan Bonggol Jagung Sebagai Bahan Campuran Pembuatan Paving block Porous, *J. Agric. Biosyst. Eng.*, 2, 345.

Pritchard, J., Filonenko, G.A., Van Putten, R., Hensen, E.J.M., and Pidko, E.A., 2015, Heterogeneous and homogeneous catalysis for the hydrogenation of carboxylic acid derivatives: History, advances and future directions, *Chem. Soc. Rev.*, 44, 3808–3833.

Rambabu, K., Bharath, G., Sivarajasekar, N., Velu, S., Sudha, P.N., Wongsakulphasatch, S., and Banat, F., 2023, Sustainable production of bio-jet fuel and green gasoline from date palm seed oil via hydroprocessing over tantalum phosphate, *Fuel*, 331, 125688.

Rashid, U.S. and Bezbaruah, A.N., 2020, Citric acid modified granular activated carbon for enhanced defluoridation, *Chemosphere*, 252, 126639.

Rasyid, R., Prihartantyo, A., Mahfud, M., and Roesyadi, A., 2015, Hydrocracking of Calophyllum inophyllum Oil With Non-sulfide CoMo Catalysts, *Bull. Chem. React. Eng. Catal.*, 10, 61–69.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Ratshoshi, S., Mukaya, H., and Nkazi, D., 2024, Hydrocracking of non-edible vegetable oil and waste cooking oils for the production of light hydrocarbon fuels: A review, *Can. J. Chem. Eng.*, 102(9), pp. 3014–3028.

Ravindran, M.X.Y., Asikin-Mijan, N., Ong, H.C., Derawi, D., Yusof, M.R., Mastuli, M.S., Lee, H. V., Wan Mahmood, W.N.A.S., Razali, M.S., Abdulkareem Al-Sultan, G., and Taufiq-Yap, Y.H., 2022, Feasibility of advancing the production of bio-jet fuel via microwave reactor under low reaction temperature, *J. Anal. Appl. Pyrolysis*, 168, 105772.

Rehman, A., Park, M., and Park, S.J., 2019, Current progress on the surface chemical modification of carbonaceous materials, *Coatings*, 9, 725.

Romero-Castro, L., Galetti, A.E., Moreno, M.S., and Barroso, M.N., 2024, Nanostructured Ni–Co catalysts: Effect of impregnation sequence and complexing agent, *Mater. Today Chem.*, 42, 102348.

Sahu, P., Gangil, S., Guru, P.K., Durga, M.L., Shukla, P., Kumar, M., Diwan, P., Kamendra, Rath, I., Sahu, R.K., Meena, B.S., Khatri, S., Sonwani, S., and Kumar, J., 2026, Pyrolysis-induced lignin transformation and its thermo-kinetic implications for biochar development, *Results in Engineering*, 30, 110216.

Sanoja-Lopez, K.A., Balu, A.M., Carmona, H. de P., Hájek, M., Luque, R., and Herrador, J.M.H., 2025, A Practical Guide to Heterogeneous Catalysis in Hydrocarbon Transformations, *Chem. Asian J.*, 20, e202400412.

Saviola, A.J., Wijaya, K., Fitria, R.A., Chang, S.W., Ravindran, B., Amin, A.K., Fitria, A., and Syoufian, A., 2025, Unlocking the potential of converting non-edible oils into sustainable jet fuel-range hydrocarbons using simply prepared nickel- or molybdenum-promoted zirconia catalysts, *Sustainable Chem. Climate Action*, 7, 100126.

Segal, F.M., Correa, M.F., Bacani, R., Castanheira, B., Politi, M.J., Brochsztain, S., and Triboni, E.R., 2018, A novel synthesis route of mesoporous ?-alumina from polyoxohydroxide aluminum, *Materials Research*, 21, e20170815.

Sen, S.K., Dutta, Seema, Khan, M.R., Manir, M.S., Dutta, Supria, Al Mortuza, A., Razia, S., and Hakim, M.A., 2019, Characterization and Antibacterial

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Activity Study of Hydrothermally Synthesized h-MoO_3 Nanorods and α-MoO_3 Nanoplates, *Bionanoscience*, 9, 873–882.

Setyono, G., Khusaini, M., Widodo, N., and Wahyudi, S., 2025, The effect of tamanu oil and oxygenated additives on spark-ignition engine performance and emissions, *Int. J. Adv. Appl. Sci.*, 12, 129–141.

Shaikh, A.A., Bhattacharjee, J., Datta, P., and Roy, S., 2024, A comprehensive review of the oxidation states of molybdenum oxides and their diverse applications, *Sustainable Chem. Environ*, 7, 100125.

Sharma, S., Kaur, M., Sharma, C., Choudhary, A., and Paul, S., 2021, Biomass-Derived Activated Carbon-Supported Copper Catalyst: An Efficient Heterogeneous Magnetic Catalyst for Base-Free Chan−Lam Coupling and Oxidations, *ACS Omega*, 6, 29124–29135.

Sharma, S.S., Islam, M.A., Negi, M.S., and Tripathi, S.B., 2015, Changes in oil content and fatty acid profiles during seed development in Pongamia pinnata (L.) Pierre, *Indian J. Plant Physiol.*, 20, 281–284.

Shiba, N.C., Liu, X., Hildebrandt, D., and Yao, Y., 2021, Effect of Pre-Treatment Conditions on the Activity and Selectivity of Cobalt-Based Catalysts for CO Hydrogenation, *Reactions*, 2, 258–274.

Sie, S.T., 1992, Acid-catalyzed cracking of paraffinic hydrocarbons. 1. Discussion of existing mechanisms and proposal of a new mechanism, *Industrial & Engineering Chemistry Research*, 31, 1421–1430.

Sing, K.S.W. and Williams, R.T., 2004, Review Physisorption Hysteresis Loops and the Characterization of Nanoporous Materials, *Adsorpt. Sci. Technol.*, 22, 773–782.

Singh, P., Sarswat, A., Pittman, C.U., Mlsna, T., and Mohan, D., 2020, Sustainable Low-Concentration Arsenite [As(III)] Removal in Single and Multicomponent Systems Using Hybrid Iron Oxide-Biochar Nanocomposite Adsorbents - A Mechanistic Study, *ACS Omega*, 5, 2575–2593.

Sornlar, W., Wannagon, A., and Supothina, S., 2021, Stabilized homogeneous porous structure and pore type effects on the properties of lightweight kaolinite-based geopolymers, *J. Build. Eng.*, 44, 103273.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Souza, L.K.C., Gonçalves, A.A.S., Queiroz, L.S., Chaar, J.S., da Rocha Filho, G.N., and da Costa, C.E.F., 2020, Utilization of acai stone biomass for the sustainable production of nanoporous carbon for CO2 capture, *Sustainable Mater. Technol.*, 25, e00168.

Sridevi, B., and Karuna, M.K., 2026, Synthesis and Characterization of Mesoporous Silica-SBA-15, *Int. J. Sci. Res. Sci. Technol.*, 13, 171–179.

Stucchi, M., Bianchi, C.L., Argirusis, C., Pifferi, V., Neppolian, B., Cerrato, G., and Boffito, D.C., 2018, Ultrasound-assisted synthesis of Ag-decorated TiO_2 active in visible light, *Ultrason. Sonochem.*, 40, 282–288.

Sugami, Y., Minami, E., and Saka, S., 2016, Renewable diesel production from rapeseed oil with hydrothermal hydrogenation and subsequent decarboxylation, *Fuel*, 166, 376–381.

Sultana, M., Rownok, M.H., Sabrin, M., Rahaman, M.H., and Alam, S.M.N., 2022, A review on experimental chemically modified activated carbon to enhance dye and heavy metals adsorption, *Clean. Eng. Technol.*, 6, 100382.

Suprianto, T., Winarto, Wijayanti, W., and Wardana, I., 2021, Effect of activated carbon catalyst on the cracking of biomass molecules into light hydrocarbons in biomass pyrolysis, *IOP Conf. Ser. Mater. Sci. Eng.*, 1034, 012079.

Susanto, B.H., and Efendi, Y., 2020, Synthesis of bio-jet fuel from coconut (*Cocos nucifera*) oil through hydrodeoxygenation using NiMoP/Al_2O_3 catalyst. In, *AIP Conf. Proc.*, 2197, 050004.

Suseno, A., Gunawan, G., Astuti, E.D., and Wijaya, R.A., 2025, Enhanced hydrocracking of oleic acid to sustainable biofuel over Ni–Cu/mesoporous silica catalyst: Effects of reaction conditions, kinetic modelling, and mechanistic insights, *Next Mater.*, 9, 101268.

Taufiqurrahmi, N., and Bhatia, S., 2011, Catalytic cracking of edible and non-edible oils for the production of biofuels, *Energy Environ. Sci.*, 4, 1087–1112.

Thongam, D.D., Hang, D.R., Liang, C. Te, Huang, H.C., and Chou, M.M.C., 2025, Ni, Co, and Mo-based trimetallic and bimetallic oxide nanocomposites as cost-effective bifunctional electrocatalysts for coupled

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

methanol oxidation and hydrogen evolution, *J. Electroanal. Chem.*, 996, 119403.

Tiong, T.J., Chu, J.K., and Tan, K.W., 2025, Advancements in Acoustic Cavitation Modelling: Progress, Challenges, and Future Directions in Sonochemical Reactor Design, *Ultrason. Sonochem.*, 112, 107163.

Tiwari, R., Mishra, R., Choubey, A., Kumar, S., Atabani, A.E., Badruddin, I.A., and Khan, T.M.Y., 2023, Environmental and economic issues for renewable production of bio-jet fuel: A global prospective, *Fuel*, 332, 126118.

Trisunaryanti, W., Triyono, Falah, I.I., Siagian, A.D., and Marsuki, M.F., 2018, Synthesis of ce-mesoporous silica catalyst and its lifetime determination for the hydrocracking of waste lubricant, *Indones. J. Chem.*, 18, 441–447.

Trujillo, C.A., Ramírez-Marquez, N.T., and Valencia-Rios, J.S., 2020, An affordable ammonia temperature-programmed desorption equipment and its calibration using the thermal decomposition of ammonium dihydrogen phosphate, *Thermochim. Acta.*, 689, 178651.

Ulya, N.A., Martin, E., Rahmat, M., Premono, B.T., Malau, L.R.E., Waluyo, E.A., Imanullah, A., Lukman, A.H., Asmaliyah, Armansyah, Saputra, D., Hadi, E.E.W., Azwar, F., Siahaan, H., Purwanto, Damanik, M., Nuralamin, Anjani, R., Cahyono, S.A., et al., 2022, Enabling Factors of NTFP Business Development for Ecosystem Restoration: The Case of Tamanu Oil in Indonesian Degraded Peatland, *Sustainability (Switzerland)*, 14.

Umurhan, Y., Songsart-Power, M., Limbu, T.B., and Phan, T., 2025, Applications of Raman spectroscopy for microplastic detection and characterization: a comprehensive spectral reference, *Environmental Science and Pollution Research*, 32, 28630–28677.

Ungár, T., 2004, Microstructural parameters from X-ray diffraction peak broadening, *Scr. Mater.*, 51, 777–781.

Vishali, K., Rupesh, K.J., Prabakaran, S., Sudalai, S., Uppuluri, K.B., and Arumugam, A., 2023, Development and techno-economic analysis of *Calophyllum inophyllum* biorefinery for the production of biodiesel, biohydrogen, bio-oil, and biochar: Waste to energy approach, *Renew. Energy*, 218, 119313.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Vishnoi, P.K., Gautam, P.S., Maheshwari, P., Samant, T.S., and Gupta, V.K., 2021, Experimental evaluation of diesel engine operating with a ternary blend (biodiesel-diesel-ethanol), *IOP Conf. Ser. Mater. Sci. Eng.*, 1168, 012017.

Visiamah, F., Trisunaryanti, W., and Triyono, 2024, Microwave-assisted coconut wood carbon-based catalyst impregnated by Ni and/or Pt for bio-jet fuel range hydrocarbons production from Calophyllum inophyllum L. oil using modified-microwave reactor, *Case Studies in Chem. Environ. Eng.*, 9, 100722.

Vogelaar, B., Eijsbouts, S., Bergwerff, J., and Heiszwolf, J., 2010, Hydroprocessing catalyst deactivation in commercial practice, *Cat. Today*, 154(3-4), pp. 256–263.

Vogt, Eelco T. C., Fu, D., and Weckhuysen, B.M., 2023, Carbon Deposit Analysis in Catalyst Deactivation, Regeneration, and Rejuvenation, *Angew. Chem. Int. Ed.*, 135, e202300319.

Wang, B., Ting, Z.J., and Zhao, M., 2024, Sustainable aviation fuels: Key opportunities and challenges in lowering carbon emissions for aviation industry, *Carbon Capture Sci. Technol.*, 13, 100263.

Wang, X., Zhang, Z., Yan, Z., Li, Q., and Zhang, Y., 2023, Catalysts with metal-acid dual sites for selective hydrodeoxygenation of lignin derivatives: Progress in regulation strategies and applications, *Appl. Catal. A Gen.*, 662, 119266.

Wei, L., Wang, H., Dong, Q., Li, Y., and Xiang, H., 2025, A Review on the Research Progress of Zeolite Catalysts for Heavy Oil Cracking, *Catalysts*, 15(4), 401,

Wild, S., Mahr, C., Rosenauer, A., Risse, T., Vasenkov, S., and Bäumer, M., 2023, New Perspectives for Evaluating the Mass Transport in Porous Catalysts and Unfolding Macro- and Microkinetics, *Catal. Letters*, 153, 3405–3422.

Wu, H., Lei, Y., Lu, J., Zhu, R., Xiao, D., Jiao, C., Xia, R., Zhang, Z., Shen, G., Liu, Y., Li, S., and Li, M., 2019, Effect of citric acid induced crosslinking on the structure and properties of potato starch/chitosan composite films, *Food Hydrocoll.*, 97.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Wu, Y., Xu, H., and Gao, J., 2021, Metal-organic framework-derived porous carbon templates for catalysis, *Emerg. Carbon Mater. Catal.*, 73–121.

Xie, N., Chen, Z., Wang, H., and You, C., 2021, Activated carbon coupled with citric acid in enhancing the remediation of Pb-Contaminated soil by electrokinetic method, *J. Clean. Prod.*, 308, 127433.

Yalçin, N., and Sevinç, V., 2000, Studies of the surface area and porosity of activated carbons prepared from rice husks, *Carbon*, 38, 1943–1945.

Yang, C., Wang, W., Wang, D., Gong, M., Xin, Y., Xiao, L., Kikhtyanin, O., Kubička, D., and Wu, W., 2022, The promotion effects of MoOx species in the highly effective NiMo/$MgAl_2O_4$ catalysts for the hydrodeoxygenation of methyl palmitate, *J. Environ. Chem. Eng.*, 10.

Ye, G., Wang, H., Duan, X., Sui, Z., Zhou, X., Coppens, M.O., and Yuan, W., 2019, Pore network modeling of catalyst deactivation by coking, from single site to particle, during propane dehydrogenation, *AIChE Journal*, 65, 140–150.

Yin, D., Shen, L., Hu, Z., Yu, S., Li, L., Liu, S., and Liu, Y., 2025, Cobalt doping induced electronic effects boosts the hydrogenation of phenol to cyclohexanone, *J. Colloid Interface Sci.*, 700, 138320.

Yuhermita, N.M., Nazarudin, N., Alfernando, O., Prabasari, I.G., and Haviz, M., 2024, Perengkahan Katalitik Minyak Jelantah Menggunakan Katalis Co-Carbon Yang Dihasilkan Dengan Metode Ion Exchange. *J. BiGME*, 1, 1–22.

Yulianto, A., Trisunaryanti, W., Triyono, T., Saviola, A.J., Wijaya, K., Kartini, I., Purwono, S., Rodiansono, R., and Mara, A., 2024, Effect of arrangements in an atmospheric hydrotreating reactor of cobalt and/or molybdenum dispersed on activated carbon catalysts toward bio-jet fuel production from refined palm oil, *Case Stud. Chem. Environ. Eng.*, 10, 100894.

Zainal, N.A., Zulkifli, N.W.M., Gulzar, M., and Masjuki, H.H., 2018, A review on the chemistry, production, and technological potential of bio-based lubricants, *Renewable and Sustainable Energy Reviews*, 82, 80–102.

Zeng, Y. and Han, X., 2024, Co-Processing Biomass with Fossil Fuels. Encycl. Renewable Energy, Sustainability Environ., Volume 1-4, 1, 731–744.

UNIVERSITAS GADJAH MADA
COBALT AND MOLYBDENUM DISPERSED ONTO CORNCOB WASTE-DERIVED ACTIVATED CARBON CATALYSTS FOR MICROWAVE-ASSISTED HYDROTREATMENT OF TAMANU OIL (Calophyllum inophyllum) INTO BIO-JET FUEL
Irene Tantri Mahadevi Muktiono, Prof. Drs. Karna Wijaya, M. Eng., Dr.rer.nat.; Drs. Iqmal Tahir, M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Zepeda, T.A., 2025, Ultrasonic-assistance influence on the impregnation method for high metal loading CoMo/Ti-HMS catalysts, *Appl. Catal. A Gen.*, 693, 120135.

Zhang, B., Gao, M., Tang, W., Wang, X., Wu, C., Wang, Q., Cheung, S.M., and Chen, X., 2023, Esterification efficiency improvement of carbon-based solid acid catalysts induced by biomass pretreatments: Intrinsic mechanism, *Energy*, 263, 125606.

Zhao, K., Shu, Y., Li, F., and Peng, G., 2023, Bimetallic catalysts as electrocatalytic cathode materials for the oxygen reduction reaction in microbial fuel cell: A review, *Green Energy Environ.*, 8, 1043–1070.

Zhao, X., Wei, L., Julson, J., and Huang, Y., 2014, Investigated Cold Press Oil Extraction from Non-Edible Oilseeds for Future Bio-Jet Fuels Production, *J. Sustain. Bioenergy Syst.*, 04, 199–214.

Zhao, Y., Jiang, H., Yang, F., Wang, R., Lu, Y.Q., and Pan, Y.F., 2025, Transition metals in water treatment: from fundamental mechanisms to practical applications, *Rare Metals*, 44, 5258–5278.

Zitouni, A., Bachir, R., Bendedouche, W., and Bedrane, S., 2021, Production of bio-jet fuel range hydrocarbons from catalytic HDO of biobased difurfurilydene acetone over Ni/SiO_2-ZrO_2 catalysts, *Fuel*, 297, 120783.

Zou, H., Chen, S., Huang, J., and Zhao, Z., 2017, Effect of impregnation sequence on the catalytic performance of NiMo carbides for the tri-reforming of methane, *Int. J. Hydrogen Energy*, 42, 20401–20409.

Žula, M., Grilc, M., and Likozar, B., 2022, Hydrocracking, hydrogenation and hydro-deoxygenation of fatty acids, esters and glycerides: Mechanisms, kinetics and transport phenomena, *Chem. Eng. J.*, 444, 136564.