DAFTAR PUSTAKA

Abdullah, F. H., Bakar, N. H. H. A., & Bakar, M. A. (2022). Current advancements on the fabrication, modification, and industrial application of zinc oxide as photocatalyst in the removal of organic and inorganic contaminants in aquatic systems. *Journal of Hazardous Materials*, *424*, 127416. https://doi.org/10.1016/j.jhazmat.2021.127416

Abdullah, J. A. A., Jiménez-Rosado, M., Guerrero, A., & Romero, A. (2023). Effect of Calcination Temperature and Time on the Synthesis of Iron Oxide Nanoparticles: Green vs. Chemical Method. *Materials*, *16*(5), 1798. https://doi.org/10.3390/ma16051798

Adeningrum, D. A., Rosa, A., Wahyusi, K. N., & Yogaswara, R. R. (2025). Biosintesis Nanopartikel ZnO Menggunakan Ekstrak Daun Tanaman Jagung (Zea Mays L.). *Jurnal Fisika Unand*, *14*(2), 160–166. https://doi.org/10.25077/jfu.14.2.160-166.2025

Ahmad, I., Shukrullah, S., Naz, M. Y., Bhatti, H. N., Ahmad, M., Ahmed, E., Ullah, S., & Hussien, M. (2022). Recent progress in rare earth oxides and carbonaceous materials modified ZnO heterogeneous photocatalysts for environmental and energy applications. *Journal of Environmental Chemical Engineering*, *10*(3), 107762. https://doi.org/10.1016/j.jece.2022.107762

Ali, A., Zhang, N., & Santos, R. M. (2023). Mineral Characterization Using Scanning Electron Microscopy (SEM): A Review of the Fundamentals, Advancements, and Research Directions. *Applied Sciences*, *13*(23), 12600. https://doi.org/10.3390/app132312600

Alwash, A. (2025). Impact of Calcination Temperature on the Structural and Photocatalytic Properties of ZnO Synthesized from Gum Arabic for Methylene Blue Dye Removal. *Journal of Hazardous Materials Advances*, *17*, 100625. https://doi.org/10.1016/j.hazadv.2025.100625

Amanati, L. (2020). *Ekstraksi Pektin dari Kulit Durian (Durio Zibethinus) untuk Industri Makanan*. *5*(2).

Amanda, N. A., Ramadhika, L. N., Bahtiar, A., Safriani, L., & Aprilia, A. (2022). PENGARUH JENIS PREKURSOR TERHADAP KARAKTERISTIK

PARTIKEL ZnO BESERTA PENGUJIAN SIFAT FOTOKATALITIKNYA. *Jurnal Material dan Energi Indonesia*, *12*(01), 08. https://doi.org/10.24198/jme.v12i01.40511

Atmaja, G. S., & Warsito, A. (t.t.). *BALLAST ELEKTRONIK LAMPU UV BERTOPOLOGI INVERTER SETENGAH JEMBATAN RESONAN LCC FREKUENSI TINGGI*.

Bemis, R., Nelson, Ngatijo, Nurjanah, S., & Maghviroh, N. (2019). Sintesis dan karakterisasi fotokatalis ZnO/karbon aktif dan aplikasinya pada degradasi rhodamin B. *CHEMPUBLISH JOURNAL*, *4*(2), 101–113. https://doi.org/10.22437/chp.v4i2.7936

Burhanudin, Setyaningtyas, T., & Riyani, K. (2024). Photodegradation of Methylene Blue Using ZnO/Perlite under Ultraviolet Light. *Science Tech: Jurnal Ilmu Pengetahuan Dan Teknologi*, *10*(2), 68–77. https://doi.org/10.30738/st.vol10.no2.a17092

Chang, J. S., Saint, C. P., Chow, C. W. K., Bahnemann, D. W., & Chong, M. N. (2024). Recent innovations in engineering Zinc Oxide (ZnO) nanostructures for water and wastewater treatment: Pushing the boundaries of multifunctional photocatalytic and advanced biotechnological applications. *International Materials Reviews*, *69*(7–8), 337–379. https://doi.org/10.1177/09506608241280421

Demastita, N. P. F., & Ningsih, B. N. S. (t.t.). *GREEN SYNTHESIS NANOPARTIKEL SENG OKSIDA (ZnO) MENGGUNAKAN EKSTRAK KULIT BUAH MANGGA (Mangifera indica L.) SEBAGAI BIOREDUKTOR*.

Demissie, M. G., Sabir, F. K., Edossa, G. D., & Gonfa, B. A. (2020). Synthesis of Zinc Oxide Nanoparticles Using Leaf Extract of Lippia adoensis (Koseret) and Evaluation of Its Antibacterial Activity. *Journal of Chemistry*, *2020*, 1–9. https://doi.org/10.1155/2020/7459042

Dewi, A. K., Aryanto, D., & Nurbaiti, U. (2020). Pengaruh Perlakuan Panas terhadap Sifat Optik Lapisan Tipis ZnO di atas ITO. *Jurnal Fisika*, *10*(1), 30–36. https://doi.org/10.15294/jf.v10i1.24580

Dewi, A. M., Widayatno, W. B., & Kusumawati, Y. (2019). Perbandingan Efektivitas Dekolorisasi Fotokatalitik Metilen Biru dan Metil Jingga menggunakan Semikonduktor ZnO pada Variasi pH. *Jurnal Riset Kimia*, *10*(2), 75–84. https://doi.org/10.25077/jrk.v10i2.328

Doan Thi, T. U., Nguyen, T. T., Thi, Y. D., Ta Thi, K. H., Phan, B. T., & Pham, K. N. (2020). Green synthesis of ZnO nanoparticles using orange fruit peel extract for antibacterial activities. *RSC Advances*, *10*(40), 23899–23907. https://doi.org/10.1039/D0RA04926C

El Fihry, N., El Mabrouk, K., Eeckhout, M., Schols, H. A., Filali-Zegzouti, Y., & Hajjaj, H. (2022). Physicochemical and functional characterization of pectin extracted from Moroccan citrus peels. *LWT*, *162*, 113508. https://doi.org/10.1016/j.lwt.2022.113508

Elina, R., Rori, D. C., & Khair, M. (2023). *Karakterisasi FTIR pada Karbon Aktif Terimpregnasi ZnO*. *7*.

Hardiantika, W., Suprihatin, S., Astuti, W., Haryono, T., & Eskani, I. N. (2023a). Pengaruh variasi suhu dan waktu pemanasan terhadap struktur kristal, komposisi kimia, morfologi dan kadar logam pada sintesis nanopartikel ZnO menggunakan metode hidrotermal. *Jurnal Rekayasa Proses*. https://doi.org/10.22146/jrekpros.77190

Hardiantika, W., Suprihatin, S., Astuti, W., Haryono, T., & Eskani, I. N. (2023b). Pengaruh variasi suhu dan waktu pemanasan terhadap struktur kristal, komposisi kimia, morfologi dan kadar logam pada sintesis nanopartikel ZnO menggunakan metode hidrotermal. *Jurnal Rekayasa Proses*. https://doi.org/10.22146/jrekpros.77190

Hasiah, Demi Dama Yanti, & Bambang Ari Wahjoedi. (2025). SINTESIS NANOPARTIKEL ZnO MENGGUNAKAN EKSTRAK DAUN MANGGA (Mangifera sp.) DAN STUDI APLIKASINYA SEBAGAI FOTODEGRADASI CONGO REDd. *ALOTROP*, *9*(1), 107–118. https://doi.org/10.33369/alo.v9i1.40396

Hizhar, D., Handani, S., & Elvaswer. (2026). Sintesis Hijau dan Karakterisasi Nanopartikel ZnO Menggunakan Ekstrak Daun Kelapa Sawit (Elaeis

guineensis). *Jurnal Fisika Unand*, *15*(2), 236–243. https://doi.org/10.25077/jfu.15.2.236-243.2026

Husni, P., Ikhrom, U. K., & Hasanah, U. (2021). Uji dan Karakterisasi Serbuk Pektin dari Albedo Durian sebagai Kandidat Eksipien Farmasi. *Majalah Farmasetika*, *6*(3), 202. https://doi.org/10.24198/mfarmasetika.v6i3.33349

Irawan, A. (2019). Kalibrasi Spektrofotometer Sebagai Penjaminan Mutu Hasil Pengukuran dalam Kegiatan Penelitian dan Pengujian. *Indonesian Journal of Laboratory*, *1*(2), 1. https://doi.org/10.22146/ijl.v1i2.44750

Istiani, A., Wardani, N. A., Kafiya, M., Hanifah, N. A., & Nukhia, Z. (2023). Karakterisasi Edible Film dari Pektin Kulit Durian, Pati Singkong, dan Gliserol. *Eksergi*, *21*(1), 17. https://doi.org/10.31315/e.v21i1.10949

K K, S., P M, P. N., & Vasundhara, M. (2023). Enhanced photocatalytic activity in ZnO nanoparticles developed using novel *Lepidagathis ananthapuramensis* leaf extract. *RSC Advances*, *13*(3), 1497–1515. https://doi.org/10.1039/D2RA06967A

Kaewsaenee, J., Singhaset, M. T., Roongraung, K., Kemacheevakul, P., & Chuangchote, S. (2023a). Polymer-Assisted Coprecipitation Synthesized Zinc Oxide Nanoparticles and Their Uses for Green Chemical Synthesis via Photocatalytic Glucose Conversions. *ACS Omega*, *8*(46), 43664–43673. https://doi.org/10.1021/acsomega.3c05183

Kaewsaenee, J., Singhaset, M. T., Roongraung, K., Kemacheevakul, P., & Chuangchote, S. (2023b). Polymer-Assisted Coprecipitation Synthesized Zinc Oxide Nanoparticles and Their Uses for Green Chemical Synthesis via Photocatalytic Glucose Conversions. *ACS Omega*, *8*(46), 43664–43673. https://doi.org/10.1021/acsomega.3c05183

Karam, S. T., & Abdulrahman, A. F. (2022). Green Synthesis and Characterization of ZnO Nanoparticles by Using Thyme Plant Leaf Extract. *Photonics*, *9*(8), 594. https://doi.org/10.3390/photonics9080594

Kombongkila, O., Taunaumang, H., & Tumimomor, F. R. (2024). Analisis Struktur Film Tipis Disperse Orange-3 Hasil FTIR. *Jurnal FisTa : Fisika dan Terapannya*, *5*(1), 45–50. https://doi.org/10.53682/fista.v5i1.305

Kusdianto, K., Puri, N. R., Shimada, M., Madhania, S., & Winardi, S. (2025). Synergistic Effect of Calcination Temperature and Silver Doping on Photocatalytic Performance of ZnO Material. *Materials*, *18*(14), 3362. https://doi.org/10.3390/ma18143362

Liang, X., Shi, L., Zhang, R., & Zhang, M. (2022). Pectin mediated green synthesis of CuO nanoparticles: Evaluation of its cytotoxicity, antioxidant and anti-human cervical cancer properties. *Journal of Experimental Nanoscience*, *17*(1), 315–325. https://doi.org/10.1080/17458080.2021.2013470

Meza, A. M., Vilchis-Nestor, A. R., & Luque, P. A. (2025). Sustainable synthesis and functionalization of ZnO photocatalysts using Amphipterygium adstringens (Cuachalalate) bark extract for the effective degradation of emerging pollutants. *Journal of Materials Science: Materials in Electronics*, *36*(12), 727. https://doi.org/10.1007/s10854-025-14696-0

Mohamed, E. A., Altalhi, A. A., Ahmed, H. M., & Negm, N. A. (2025). High-performance photocatalytic degradation of methylene blue from industrial wastewater using bio-inspired ZnO nanoparticles under visible light. *Desalination and Water Treatment*, *324*, 101539. https://doi.org/10.1016/j.dwt.2025.101539

Mutukwa, D., Taziwa, R., & Khotseng, L. E. (2022). A Review of the Green Synthesis of ZnO Nanoparticles Utilising Southern African Indigenous Medicinal Plants. *Nanomaterials*, *12*(19), 3456. https://doi.org/10.3390/nano12193456

Nasir, N. H., Fitratullah, C., Arfshal, T. M., Dewi, R., & Ninsi, M. N. (2024). *IDENTIFIKASI JAMU YANG BEREDAR DI KOTA MAKASSAR MENGGUNAKAN METODE SPEKTROFOTOMETRI UV-VIS*. *1*(1).

Navratinova, S. (2019). HUBUNGAN DESINFEKSI SINAR ULTRAVIOLET (UV) DENGAN KUALITAS BAKTERIOLOGIS AIR MINUM PADA DEPOT AIR MINUM ISI ULANG (DAMIU) (Studi di Kecamatan Pontianak Selatan Kota Pontianak). *JURNAL KESEHATAN MASYARAKAT*, *7*.

Nguyen, P. A. T., Nguyen, T. T. T., & Vo, D. K. N. (2024). Pectin from durian peel (Durio zibethinus Murr.) - a novel reducing and stabilizing agent:

Physicochemical properties, green synthesis of silver nanoparticles and antimicrobial properties. *Carbohydrate Polymer Technologies and Applications*, *8*, 100623. https://doi.org/10.1016/j.carpta.2024.100623

Ningsih, S. K. W., & Khair, M. (2021). *Synthesis and Characterization of ZnO Nanoparticles Using Sol-Gel Method*.

Okto, S. H. S. (t.t.). *REVIEW: GREEN SYNTHESIS NANOPARTIKEL TiO2 SEBAGAI MATERIAL FOTOKATALIS*.

Ong, C. B., Ng, L. Y., & Mohammad, A. W. (2018). A review of ZnO nanoparticles as solar photocatalysts: Synthesis, mechanisms and applications. *Renewable and Sustainable Energy Reviews*, *81*, 536–551. https://doi.org/10.1016/j.rser.2017.08.020

Pamungkas, P. P., & Djonu, A. (2022). *MIKROSTRUKTUR DENGAN SCANNING ELECTRON MICROSCOPE DAN KARAKTERISTIK SENSORI PADA NORI ALGA MERAH (Gracilaria gigas)*.

Patel, A. K., Kawale, A. P., Sharma, N., Shekhar, N., Banerjee, S., & Srivastava, A. (2024). Synthesis and Characterization of CMC-Wrapped ZnONPs at Different Calcination Temperatures for Photocatalytic Degradation of Methylene Blue Dye under Sunlight. *Journal of Polymer Materials*, *41*(2), 69–86. https://doi.org/10.32604/jpm.2024.052695

Putri, A. T., Lestari, T. A., Fitrichia, R., & Widiarti, N. (2025). Efisiensi Degradasi Limbah Methylene Blue Menggunakan Sintesis Hijau Fotokatalis ZnO Ekstrak Nanas dan Karbon Aktif Sekam Padi. *ALCHEMY Jurnal Penelitian Kimia*, *21*(2), 369. https://doi.org/10.20961/alchemy.21.2.95927.369-377

Putri, H. A. S., Oktarini, R., Islamiyah, S., Redjeki, S., & Yogaswara, R. R. (2024). Potensi Ekstrak Kulit Buah Naga Merah (Hylocereus polyrhizus) sebagai Bioreduktor Untuk Biosintesis Nanopartikel. *Jurnal Fisika Unand*, *13*(4), 497–503. https://doi.org/10.25077/jfu.13.4.497-503.2024

Raganata, T. C., Aritonang, H., & Suryanto, E. (2020). SINTESIS FOTOKATALIS NANOPARTIKEL ZnO UNTUK MENDEGRADASI ZAT WARNA METHYLENE BLUE. *CHEMISTRY PROGRESS*, *12*(2). https://doi.org/10.35799/cp.12.2.2019.27923

Rahayu, N. A. I., Sylvia, N., Bahri, S., Meriatna, M., & Muarif, A. (2022). ADSORPSI ZAT WARNA METHYLENE BLUE MENGGUNAKAN ADSORBEN DARI AMPAS TEH PADA KOLOM. *Chemical Engineering Journal Storage (CEJS)*, *2*(2), 75–86. https://doi.org/10.29103/cejs.v2i2.7030

Rahman, M., Kamruzzaman, M., Zapien, J. A., Afrose, R., Anam, T. K., Liton, M. N. H., Helal, M. A., & Khan, M. K. R. (2022). Conversion of n-type to p-type conductivity in ZnO by incorporation of Ag and Ag-Li. *Materials Today Communications*, *33*, 104278. https://doi.org/10.1016/j.mtcomm.2022.104278

Ramadanti, A. H., & Maharani, D. K. (2022). *Green Synthesis of ZnO Nanoparticles with Papaya Leaf Extract (Carica papaya L.) as a Reductor and its Application on Cotton Fabrics*.

Repiani. (2025). Green Synthesis Nanopartikel Seng Oksida (ZnO) dengan Menggunakan Ekstrak Daun Kakao Sebagai Capping Agent. *Mei 2025, Vol. 14, No. 3, Mei 2025, hal. 212 – 217*. https://doi.org/10.25077/jfu.10.3.212-217.2025

Romadan, M. (2019). Sintesis Nanopartikel ZnO dan Aplikasinya sebagai Edible CoatingBerbasis Pektin untuk Memperpanjang Umur Simpan Buah Belimbing. *2019*, *5*(1).

Rusli, R., Hilmi, M., Mahata, M., Yuniza, A., Zurmiati, Z., Reski, S., Mutia, R., & Hidayat, C. (2024). Green synthesis of zinc oxide nanoparticles utilizing extract from Garcinia mangostana leaves: Characterization and optimization of calcination temperature. *Journal of Advanced Veterinary and Animal Research*, *11*(3), 573. https://doi.org/10.5455/javar.2024.k807

Saidani, A., Boudraa, R., Fendi, K., Benouadah, L., Benabbas, A., Djermoune, A., Salvestrini, S., Bollinger, J.-C., Alayyaf, A., & Mouni, L. (2024). Effect of Calcination Temperature on the Photocatalytic Activity of Precipitated ZnO Nanoparticles for the Degradation of Rhodamine B Under Different Light Sources. *Water*, *17*(1), 32. https://doi.org/10.3390/w17010032

Sari, N. W., & Fajri, M. (2018). ANALISIS FITOKIMIA DAN GUGUS FUNGSI DARI EKSTRAK ETANOL PISANG GOROHO MERAH (MUSA ACUMINATE (L)). *2018*.

Sephia, R. (2023). Review Artikel: Analisis Karakteristik Dan Pengaplikasian Teknologi Nanopartikel Berdasarkan Klasifikasinya Pada Berbagai Jenis Terapi. *September 2023*, *9 (18)*, *675-682*. https://doi.org/DOI:%20https://doi.org/10.5281/zenodo.8324839

Septiano, A. F., Susilo, S., & Setyaningsih, N. E. (2021). Analisis Citra Hasil Scanning Electron Microscopy Energy Dispersive X-Ray (SEM EDX) Komposit Resin Timbal dengan Metode Contrast to Noise Ratio (CNR). *Indonesian Journal of Mathematics and Natural Sciences*, *44*(2), 81–85. https://doi.org/10.15294/ijmns.v44i2.33143

Sharma, V., Sharma, J. K., Kansay, V., Sharma, V. D., Sharma, A., Kumar, S., Sharma, A. K., & Bera, M. K. (2023). The effect of calcination temperatures on the structural and optical properties of zinc oxide nanoparticles and their influence on the photocatalytic degradation of leather dye. *Chemical Physics Impact*, *6*, 100196. https://doi.org/10.1016/j.chphi.2023.100196

Siriya Pushpa, K. C., Sakthivel, P., Saravanakumar, K., Anuradha, N., Sankaranarayanan, R. K., & Paulraj, M. S. (2022). Structural, Morphological, Optical, and Antibacterial Activities of Zinc Oxide Nanopowders: A Comparative Study of Green and Soft Chemical Synthesis. *Advances in Materials Science and Engineering*, *2022*, 1–11. https://doi.org/10.1155/2022/7778328

Sri, W. (2019). GREEN SYNTHESIS NANOPARTIKEL ZnO SEBAGAI FOTOKATALIS UNTUK MENDEGRADASI METILEN BIRU. *e-Proceeding of Engineering*, *6*(2).

Suciyati, S., & Manurung, P. (2024). *Peningkatan Fungsi Daun Chaya sebagai Agen Reduksi pada Sintesis Seng Nanopartikel*. *12*(01).

Sulistyani, M., Huda, N., & Prasetyo, R. (2023). *Calibration of Microplate Uv-Vis Spectrophotometer for Quality Assurance Testing of Vitamin C using Calibration Curve Method*.

Syuhada, N., Gareso, P. L., & Juarlin, E. (t.t.). *THE INFLUENCE OF NITROGEN DOPAND TO OPTICAL AND STRUCTURE CHARACTERIZATION OF ZNO FILMS*.

Verma, V., Al-Dossari, M., Singh, J., Rawat, M., Kordy, M. G. M., & Shaban, M. (2022). A Review on Green Synthesis of TiO2 NPs: Photocatalysis and Antimicrobial Applications. *Polymers*, *14*(7), 1444. https://doi.org/10.3390/polym14071444

Wahyuni, A. M., Afthoni, M. H., & Rollando, R. (2022). Pengembangan dan Validasi Metode Analisis Spektrofotometri UV Vis Derivatif untuk Deteksi Kombinasi Hidrokortison Asetat dan Nipagin pada Sediaan Krim. *Sainsbertek Jurnal Ilmiah Sains & Teknologi*, *3*(1), 239–247. https://doi.org/10.33479/sb.v3i1.181

Wang, F., Du, C., Chen, J., Shi, L., & Li, H. (2021). A New Method for Determination of Pectin Content Using Spectrophotometry. *Polymers*, *13*(17), 2847. https://doi.org/10.3390/polym13172847

Wang, J., & Ji, H. (2023). Effect of preparation conditions on the properties of nano ZnO powders during ultrasonic assisted direct precipitation process. *PLOS ONE*, *18*(8), e0286765. https://doi.org/10.1371/journal.pone.0286765

Wongrerkdee, S., Wongrerkdee, S., Boonruang, C., & Sujinnapram, S. (2022). Enhanced Photocatalytic Degradation of Methylene Blue Using Ti-Doped ZnO Nanoparticles Synthesized by Rapid Combustion. *Toxics*, *11*(1), 33. https://doi.org/10.3390/toxics11010033

Yanti, D. D., Angelina, G., Ashari, A., Agung, A. A. J., & Ayuwulanda, A. (2024). The Synthesis of Zinc Oxide (ZnO) Nanoparticles Using Extract Tomato (Solanum lycopersicum) As Capping Agent and Its Antioxidant Activity. *Stannum : Jurnal Sains dan Terapan Kimia*, *6*(1), 10–20. https://doi.org/10.33019/jstk.v6i1.4394

Yusuf, A. N., Putra, N. K., & Suter, I. K. (2020). PENGARUH pH LARUTAN PENGEKSTRAK TERHADAP RENDEMEN DAN KARAKTERISTIK PEKTIN ALBEDO KULIT BUAH DURIAN. *Jurnal Ilmu dan Teknologi Pangan (ITEPA)*, *9*(1), 65. https://doi.org/10.24843/itepa.2020.v09.i01.p08

Zulaicha, A. S., Saputra, I. S., Sari, I. P., Ghifari, M. A., Yulizar, Y., Permana, Y. N., & Sudirman, S. (2021). Green Synthesis Nanopartikel Perak (AgNPs) Menggunakan Bioreduktor Alami Ekstrak Daun Ilalang (Imperata cylindrica L). *RAFFLESIA JOURNAL OF NATURAL AND APPLIED SCIENCES*, *1*(1), 11–19. https://doi.org/10.33369/rjna.v1i1.15588