

## DAFTAR PUSTAKA

Abdel Maksoud, M. I. A., Fahim, R. A., Shalan, A. E., Abd Elkodous, M., Olojede, S. O., Osman, A. I., Farrell, C., Al-Muhtaseb, A. H., Awed, A. S., Ashour, A. H., & Rooney, D. W. (2021). Advanced materials and technologies for supercapacitors used in energy conversion and storage: a review. In *Environmental Chemistry Letters* (Vol. 19, Issue 1). Springer International Publishing. <https://doi.org/10.1007/s10311-020-01075-w>

Abdou Ahmed Abdou Elsehsah, K., Ahmad Noorden, Z., & Mat Saman, N. (2024). Current insights and future prospects of graphene aerogel-enhanced supercapacitors: A systematic review. *Heliyon*, *10*(17), e37071. <https://doi.org/10.1016/j.heliyon.2024.e37071>

Al-Ghurabi, E. H., Boumaza, M. M., Al-Masry, W., & Asif, M. (2025). Optimizing the synthesis of nanoporous activated carbon from date-palm waste for enhanced CO<sub>2</sub> capture. *Scientific Reports*, *15*(1), 1–19. <https://doi.org/10.1038/s41598-025-00498-1>

Al-Kelani, M., & Buthelezi, N. (2024). Advancements in medical research: Exploring Fourier Transform Infrared (FTIR) spectroscopy for tissue, cell, and hair sample analysis. *Skin Research and Technology*, *30*(6), 1–13. <https://doi.org/10.1111/srt.13733>

Armynah, B., Nairanti, D., Agustino, A., Taer, E., & Tahir, D. (2024a). Discarded Perseaamericana leaf-derived natural O, Mg, and Ca self-doped activated carbon and its applications as electrode materials for high-performance symmetric supercapacitors. *Diamond and Related Materials*, *143*(October 2023), 110879. <https://doi.org/10.1016/j.diamond.2024.110879>

Armynah, B., Nairanti, D., Agustino, A., Taer, E., & Tahir, D. (2024b). Discarded Perseaamericana leaf-derived natural O, Mg, and Ca self-doped activated carbon and its applications as electrode materials for high-performance symmetric supercapacitors. *Diamond and Related Materials*, *143*(January), 110879. <https://doi.org/10.1016/j.diamond.2024.110879>

Arnandan, P. T., Nadyaini Wan Omar, W. N., Hassan, Z. H., Abd Muhaimin, M. S., Jihat@Ahmad, D. A., Michele Raissa, M. M., Shamjuddin, A., Chang, K. L., & Amin, N. A. S. (2025). Novel sequential ozonolysis-hydrolysis treatments for microcrystalline cellulose synthesis from oil palm empty fruit bunch. *Biomass and Bioenergy*, *199*(January), 107902. <https://doi.org/10.1016/j.biombioe.2025.107902>



di, D. A., Agustino, A., Taer, E., & Farma, R. (2021). The supercapacitor carbon electrodes based on sugar palm fronds and physical activation combination. *Journal of Aceh Physics* 56–69. <https://doi.org/10.24815/jacps.v10i3.18517>

., Prabha, D. R., Mishra, S., & Pandey, V. (2024). Mechanical, and water absorption properties of novel kenaf fiber, glass fiber composites reinforced with epoxy. *Scientific Reports*, *14*(1), 1–

21. <https://doi.org/10.1038/s41598-024-81314-0>

Balasubramani, V., Nagarajan, K. J., Karthic, M., & Pandiyarajan, R. (2024). Extraction of lignocellulosic fiber and cellulose microfibrils from agro waste-palmyra fruit peduncle: Water retting, chlorine-free chemical treatments, physio-chemical, morphological, and thermal characterization. *International Journal of Biological Macromolecules*, 259(P2), 129273. <https://doi.org/10.1016/j.ijbiomac.2024.129273>

Daget, T. M., Kassie, B. B., & Tassew, D. F. (2025). Extraction and characterization of natural cellulosic stem fiber from Melekuya (*Plumbago zeylanicum* L.) plant for sustainable reinforcement in polymer composites. *International Journal of Biological Macromolecules*, 304. <https://doi.org/10.1016/j.ijbiomac.2025.141061>

Durai, M., Sivakumar, M., Chang, H., Ahn, Y. H., & Durai, M. (2021). An enhanced electrochemical energy storage performance based on porous activated carbon and hard carbon derived from natural maple leaf. *Journal of Materials Science: Materials in Electronics*, 32(3), 3487–3497. <https://doi.org/10.1007/s10854-020-05095-8>

Feng, S., & Lazkano, I. (2025). Energy storage and clean energy transitions. *Energy Policy*, 198(December 2024), 114447. <https://doi.org/10.1016/j.enpol.2024.114447>

Forouzandeh, P., Kumaravel, V., & Pillai, S. C. (2020). Electrode materials for supercapacitors: A review of recent advances. *Catalysts*, 10(9), 1–73. <https://doi.org/10.3390/catal10090969>

Gan, Y. X. (2021). Activated Carbon from Biomass Sustainable Sources. *C*, 7(2), 39. <https://doi.org/10.3390/c7020039>

Ha, Y., & Jeon, J. (2024). Thermogravimetric analysis and pyrolysis characterization of expanded–polystyrene and polyurethane–foam insulation materials. *Case Studies in Thermal Engineering*, 54(December 2023). <https://doi.org/10.1016/j.csite.2024.104002>

Huda, A. N. et al. (2022). *Pemanfaatan Karbon Aktif dari Sekam Padi Sebagai Elektroda Superkapasitor*. 06(02), 102–113.

Jafari, M., & Botte, G. G. (2023). Sustainable Green Route for Activated Carbon Synthesis from Biomass Waste for High-Performance Supercapacitors. *ACS Omega*. <https://doi.org/10.1021/acsomega.3c09438>



vich, A., Sumerskii, I., Von Schoultz, S., Vähäsalo, L., Willför, J. (2019). Structural and thermal analysis of softwood lignins isolated by hot water extraction biorefinery process and modified lignins. *Molecules*, 24(2). <https://doi.org/10.3390/molecules24020335>

van, W. B. (2021). Karakteristik Karbon Aktif Limbah Kulit Lada (*Piper nigrum* L.) sebagai Elektroda Superkapasitor. *Jurnal Riset Fisika*

*Indonesia*, 2(1), 7–14. <https://doi.org/10.33019/jrfi.v2i1.3171>

Muddasar, M., Beaucamp, A., Culebras, M., & Collins, M. N. (2022). Cellulose: Characteristics and applications for rechargeable batteries. *International Journal of Biological Macromolecules*, 219(June), 788–803. <https://doi.org/10.1016/j.ijbiomac.2022.08.026>

Muflihatun. (2025). Pemanfaatan Karbon Aktif Berbasis Biomassa Lokal sebagai Material Elektroda Superkapasitor: Review. *Newton-Maxwell Journal of Physics*, 6(1), 22–29. <https://doi.org/10.33369/nmj.v6i1.40787>

Murali, G., Kesavan, T., Anandha babu, G., Ponnusamy, S., Harish, S., & Navaneethan, M. (2022). Improved supercapacitor performance based on sustainable synthesis using chemically activated porous carbon. *Journal of Alloys and Compounds*, 906, 164287. <https://doi.org/10.1016/j.jallcom.2022.164287>

Novitra, R., Aziz, H., & Taer, E. (2022). Supercapactors based on active carbon from spent arabica coffee ground using NaOH activators. *Journal of Aceh Physics Society*, 11(1), 33–40. <https://doi.org/10.24815/jacps.v11i1.22227>

Nuradi, R. F. (2022). Pembuatan Superkapasitor Dari Karbon Aktif kulit Buah KAKAO Sebagai Penyimpan Energi. *Pertanian Organik*, 02520002, 1–15.

Page, R. S. C. A. (2013). Electrochemical measurements employed in the present work. ? *Supporting Information Preparation*, V, 22–28.

Pazo-Cepeda, M. V., Nastasiienko, N. S., Kulik, T. V., Palianytsia, B. B., Alonso, E., & Aspromonte, S. G. (2023). Adsorption and thermal transformation of lignin model compound (ferulic acid) over HY zeolite surface studied by temperature programmed desorption mass-spectrometry, FTIR and UV–Vis spectroscopy. *Microporous and Mesoporous Materials*, 348(November 2022). <https://doi.org/10.1016/j.micromeso.2022.112394>

Qureshi, M. S., Oasmaa, A., Pihkola, H., Deviatkin, I., Tenhunen, A., Mannila, J., Minkkinen, H., Pohjakallio, M., & Laine-Ylijoki, J. (2020). Pyrolysis of plastic waste: Opportunities and challenges. *Journal of Analytical and Applied Pyrolysis*, 152(February). <https://doi.org/10.1016/j.jaap.2020.104804>

Sharma, S., & Chand, P. (2023). Supercapacitor and electrochemical techniques: A brief review. *Results in Chemistry*, 5(November 2022), 100885. <https://doi.org/10.1016/j.rechem.2023.100885>

Shrestha, D. (2024). Structural and electrochemical evaluation of renewable their composites on different carbonization temperatures for applications. *Heliyon*, 10(4), e25628. [10.1016/j.heliyon.2024.e25628](https://doi.org/10.1016/j.heliyon.2024.e25628)

& Joshi, A. (2021). Biomass derived carbon for supercapacitor review. *Journal of Energy Storage*, 39(April), 102646. [10.1016/j.est.2021.102646](https://doi.org/10.1016/j.est.2021.102646)



- Susanti, R. F., Wiratmadja, R. G. R., Kristianto, H., Arie, A. A., & Nugroho, A. (2022). Synthesis of high surface area activated carbon derived from cocoa pods husk by hydrothermal carbonization and chemical activation using zinc chloride as activating agent. *Materials Today: Proceedings*, 63, S55–S60. <https://doi.org/10.1016/j.matpr.2022.01.042>
- Światły-Błaszkiwicz, A., Gębalski, J., Kaczmarek, T., Załuski, D., & Kupcewicz, B. (2025). Exploring ED-XRF and ATR-FTIR spectroscopic techniques in medicinal plant research: A pilot study with *Scutellaria baicalensis* roots. *Journal of Pharmaceutical and Biomedical Analysis*, 265(June). <https://doi.org/10.1016/j.jpba.2025.117008>
- Szkoda, M., Skorupska, M., Łukaszewicz, J. P., & Ilnicka, A. (2023). Enhanced supercapacitor materials from pyrolyzed algae and graphene composites. *Scientific Reports*, 13(1), 1–13. <https://doi.org/10.1038/s41598-023-48166-6>
- Taer, E., Afdal Yusra, D., Amri, A., Awitdrus, Taslim, R., Apriwandi, Agustino, & Putri, A. (2020). The synthesis of activated carbon made from banana stem fibers as the supercapacitor electrodes. *Materials Today: Proceedings*, 44, 3346–3349. <https://doi.org/10.1016/j.matpr.2020.11.645>
- Taer, E., Apriwandi, A., Rusdi, H., Ismardi, A., & Taslim, R. (2023). Improving volumetric supercapacitors performance with additive-free solid cylinder design of O, Zn, and Cl multi-doped biomass-based carbon source. *Bioresource Technology Reports*, 24(September), 101631. <https://doi.org/10.1016/j.biteb.2023.101631>
- Taer, E., Apriwandi, A., Taslim, R., Agustino, A., & Yusra, D. A. (2020). Conversion *Syzygium oleana* leaves biomass waste to porous activated carbon nanosheet for boosting supercapacitor performances. *Journal of Materials Research and Technology*, 9(6), 13332–13340. <https://doi.org/10.1016/j.jmrt.2020.09.049>
- Taer, E., Ira, A., Sugianto, S., & Taslim, R. (2016). *Pengaruh Jenis Aktivator Kimia Terhadap Densitas Dan Kapasitansi Spesifik Elektroda Karbon Aktif Dari Serbuk Gergaji Kayu Karet*. V, SNF2016-MPS-79-SNF2016-MPS-84. <https://doi.org/10.21009/0305020215>
- Taer, E., Tampubolon, D. K. H., Apriwandi, Farma, R., Setiadi, R. N., & Taslim, R. (2021). Longan leaves biomass-derived renewable activated carbon materials for electrochemical energy storage. *Journal of Physics: Conference Series*, 2049(1). <https://doi.org/10.1088/1742-6596/2049/1/012009>
- Yin, H., Huang, X., Song, X., Miao, H., & Mu, L. (2022). Co-pyrolysis of de-oiled waste and coconut shell via TG/DTG-FTIR and machine learning analysis characteristics, gas products, and thermo-kinetics. *Fuel*, 17. <https://doi.org/10.1016/j.fuel.2022.125517>
- Vang, C., Zhong, L., Fu, F., Zhu, J., Zhang, Z., Qin, Y., Yang, . (2022). Lignin derived carbon materials: current status and *Carbon Research*, 1(1), 1–39. <https://doi.org/10.1007/s44246->

