

DAFTAR PUSTAKA

- Ahmadi-Ashtiani, H. R., Baldisserotto, A., Cesa, E., Manfredini, S., Zadeh, H. S., Gorab, M. G., Khanahmadi, M., Zakizadeh, S., Buso, P., & Vertuani, S. (2020). Microbial biosurfactants as key multifunctional ingredients for sustainable cosmetics. *Cosmetics*, 7(2), 1–34. <https://doi.org/10.3390/COSMETICS7020046>
- Albornoz, R. V., Oyarzún, D., & Burgess, K. (2024). Optimisation of surfactin yield in *Bacillus* using data-efficient active learning and high-throughput mass spectrometry. *Computational and Structural Biotechnology Journal*, 23(February), 1226–1233. <https://doi.org/10.1016/j.csbj.2024.02.012>.
- Albuquerque, A. P. da C., Ferreira, H. de S., Silva, Y. A. da, Silva, R. R. da, Lima, C. V. A. de, Sarubbo, L. A., & Luna, J. M. (2025). Biosurfactant produced by *Bacillus subtilis* UCP 1533 isolated from the Brazilian semiarid region: characterization and antimicrobial potential. *Microorganisms*, 13(7), 1548.
- Aoki, R., Kumagawa, E., Kamata, K., Ago, H., Sakai, N., Hasunuma, T., Taoka, N., Ohta, Y., & Kobayashi, S. (2025). Engineering of acyl ligase domain in non-ribosomal peptide synthetases to change fatty acid moieties of lipopeptides. *Communications Chemistry*, 8(1), 17.
- Cao, X.-H., Liao, Z.-Y., Wang, C.-L., Yang, W.-Y., & Lu, M.-F. (2009). Evaluation of a lipopeptide biosurfactant from *Bacillus natto* TK-1 as a potential source of anti-adhesive, antimicrobial and antitumor activities. *Brazilian Journal of Microbiology*, 40, 373–379.
- Ciurko, D., Czyżnikowska, Ż., Kancelista, A., Łaba, W., & Janek, T. (2022). Sustainable production of biosurfactant from agro-industrial oil wastes by *Bacillus subtilis* and its potential application as antioxidant and ACE inhibitor. *International Journal of Molecular Sciences*, 23(18), 10824.
- de Paiva, W. K. V., de Sales Oliveira, L. B., Silva, M. C. N., Oliveira, M. L. P. L., de Almeida Maia, J. W., de Araújo Padilha, C. E., Rios, N. S., de Assis, C. F., de Sousa Junior, F. C., & de Oliveira Viana, J. (2024). Exploiting the biological activities of a lipopeptide extract produced by *Bacillus subtilis* UFPEDA 438 in light of the SARS-CoV-2 pandemic. *Biocatalysis and Agricultural Biotechnology*, 58, 103215.
- Dini, S., Bekhit, A. E.-D. A., Roohinejad, S., Vale, J. M., & Agyei, D. (2024a). The physicochemical and functional properties of biosurfactants: a review. *Molecules*, 29(11), 2544.
- Dini, S., Oz, F., Bekhit, A. E. A., Carne, A., & Agyei, D. (2024b). Production, characterization, and potential applications of lipopeptides in food systems: A comprehensive review. *Comprehensive reviews in food science and food safety*, 23(4), e13394.
- Dussert, E., Tourret, M., Dupuis, C., Noblecourt, A., Behra-Miellet, J., Flahaut, C., Ravallec, R., & Coutte, F. (2022). Evaluation of antiradical

- and antioxidant activities of lipopeptides produced by *Bacillus subtilis* strains. *Frontiers in microbiology*, 13, 914713.
- Dutta, B., & Bandopadhyay, R. (2022). Biotechnological potentials of halophilic microorganisms and their impact on mankind. *Beni-Suef University Journal of Basic and Applied Sciences*, 11(1). <https://doi.org/10.1186/s43088-022-00252-w>.
- Elias, R. J., Kellerby, S. S., & Decker, E. A. (2008). Antioxidant activity of proteins and peptides. *Critical reviews in food science and nutrition*, 48(5), 430–441.
- Gulcin, İ., & Alwasel, S. H. (2023). DPPH Radical Scavenging Assay. *Processes*, 11(8). <https://doi.org/10.3390/pr11082248>.
- Gunawan, K. E. D., Priyanto, J. A., & Mubarik, N. R. (2023). Seleksi dan Karakterisasi Bakteri Halotoleran Penghasil Enzim Amilase Dari Produk Fermentasi Ikan-Inasua. *Jurnal Sumberdaya Hayati*, 9(3), 96–103. <https://doi.org/10.29244/jsdh.9.3.96-103>.
- Gutiérrez-Chávez, C., Benaud, N., & Ferrari, B. C. (2021). The ecological roles of microbial lipopeptides: Where are we going? *Computational and structural biotechnology journal*, 19, 1400–1413.
- Inugrah, T. A. (2024). *Karakterisasi Biosurfaktan Lipopeptida dari Bakteri Halofilik Bacillus Clausii JIG-0%B dan Aplikasinya pada Ex-Situ MEOR*. Universitas Diponegoro. Semarang.
- Jemil, N., Ben Ayed, H., Manresa, A., Nasri, M., & Hmidet, N. (2017). Antioxidant properties, antimicrobial and anti-adhesive activities of DCS1 lipopeptides from *Bacillus methylotrophicus* DCS1. *BMC Microbiology*, 17(1), 1–11. <https://doi.org/10.1186/s12866-017-1050-2>.
- Jung, M., Lee, J., Park, S. J., & Na, J. (2024). Gas supply apparatus using rotational motion of shaking incubator for flask culture of aerobic microorganisms. *Engineering in Life Sciences*, 24(7), e2300243.
- Kamila, N. R. N. (2024). *Pengaruh Jenis Sumber Karbon pada Produksi Biosurfaktan Oleh BAKTERI Halofilik Bacillus clausii JIG-0%B dan Aplikasinya pada Ex-Situ Microbial Enhanced Oil Recovery*. Universitas Diponegoro. Semarang.
- Karnwal, A., Shrivastava, S., Al-Tawaha, A. R. M. S., Kumar, G., Singh, R., Kumar, A., Mohan, A., Yogita, & Malik, T. (2023). Microbial biosurfactant as an alternate to chemical surfactants for application in cosmetics industries in personal and skin care products: a critical review. *BioMed Research International*, 2023(1), 2375223.
- Khalfallah, A. (2023). Structure and Applications of Surfactants. Dalam O. Owoseni (Ed.), *Surfactants - Fundamental Concepts and Emerging Perspectives*. IntechOpen. <https://doi.org/10.5772/intechopen.111401>
- Kiran, G. S., Priyadharsini, S., Sajayan, A., Priyadharsini, G. B., Poulouse, N., & Selvin, J. (2017). Production of lipopeptide biosurfactant by a marine *Nesterenkonia* sp. and its application in food industry. *Frontiers in microbiology*, 8, 1138.

- Koh, J.-J., Lin, S., Beuerman, R. W., & Liu, S. (2017). Recent advances in synthetic lipopeptides as anti-microbial agents: designs and synthetic approaches. *Amino Acids*, 49(10), 1653–1677.
- Kumari, K., Behera, H. T., Nayak, P. P., Sinha, A., Nandi, A., Ghosh, A., Saha, U., Suar, M., Panda, P. K., & Verma, S. K. (2023). Amelioration of lipopeptide biosurfactants for enhanced antibacterial and biocompatibility through molecular antioxidant property by methoxy and carboxyl moieties. *Biomedicine & Pharmacotherapy*, 161, 114493.
- Kurniati, T. H., Rahayu, S., Sukmawati, D., & Maharani, W. (2019). Screening of biosurfactant producing bacteria from hydrocarbon contaminated soil. *Journal of Physics: Conference Series*, 1402(5). <https://doi.org/10.1088/1742-6596/1402/5/055026>.
- Lavanya, M. (2024). Rhamnolipids: an insight to the overall characteristics of these extraordinary biomolecules. *Green Chemistry Letters and Reviews*, 17(1), 2371012.
- Li, Y., Ye, R. Q., & Mu, B. Z. (2009). Influence of sodium ions on micelles of surfactin-C16 in solution. *Journal of Surfactants and Detergents*, 12(1), 31–36. <https://doi.org/10.1007/s11743-008-1094-2>.
- Liu, C., Baffoe, D. K., Zhan, Y., Zhang, M., Li, Y., & Zhang, G. (2019). Halophile, an essential platform for bioproduction. *Journal of Microbiological Methods*, 166, 105704.
- Loeto, D., Jongman, M., Lekote, L., Muzila, M., Mokomane, M., Motlhanka, K., Ndlovu, T., & Zhou, N. (2021). Biosurfactant production by halophilic yeasts isolated from extreme environments in Botswana. *FEMS Microbiology Letters*, 368(20), fnab146.
- Massarweh, O., & Abushaikh, A. S. (2022). A review of recent developments in CO₂ mobility control in enhanced oil recovery. *Petroleum*, 8(3), 291–317.
- Mckenna, P. P., Naughton, P. J., Dooley, J. S. G., Ternan, N. G., Lemoine, P., & Banat, I. M. (2024). *Microbial Biosurfactants : Antimicrobial Activity and Potential Biomedical and Therapeutic Exploits*. 1–13.
- Mondal, M. H., Sarkar, A., Maiti, T. K., & Saha, B. (2017). Microbial assisted (*pseudomonas* sp.) production of novel bio-surfactant rhamnolipids and its characterisation by different spectral studies. *Journal of Molecular Liquids*, 242, 873–878.
- Munteanu, I. G., & Apetrei, C. (2021). Analytical methods used in determining antioxidant activity: A review. *International Journal of Molecular Sciences*, 22(7). <https://doi.org/10.3390/ijms22073380>.
- Nagtode, V. S., Cardoza, C., Yasin, H. K. A., Mali, S. N., Tambe, S. M., Roy, P., Singh, K., Goel, A., Amin, P. D., & Thorat, B. R. (2023). Green surfactants (biosurfactants): a petroleum-free substitute for Sustainability— Comparison, applications, market, and future prospects. *ACS omega*, 8(13), 11674–11699.
- Nasution, A. M. T., Suyanto, P. D. H., Fadhli Ama, S. T. M. T., & Fitri Rahmah, S. T. M. T. (2024). *Multimodal Spectroscopy: Konsep Dasar*

- dan Aplikasinya (Volume I): Indonesia. ITS Tekno Sains. <https://books.google.co.id/books?id=gJf7EAAAQBAJ>.
- Nazhifan, S. F., Dewi, K., & Asih, E. N. N. (2023). Bakteri halofilik dan halotoleran dari air baku tambak garam Universitas Trunojoyo Madura. *Jurnal Pengolahan Hasil Perikanan Indonesia*, 26(1), 67–76. <https://doi.org/10.17844/jphpi.v26i1.44536>.
- Nnyigide, O. S., Lee, S. G., & Hyun, K. (2019). In Silico Characterization of the Binding Modes of Surfactants with Bovine Serum Albumin. *Scientific Reports*, 9(1), 1–16. <https://doi.org/10.1038/s41598-019-47135-2>.
- Pasieczna-Patkowska, S., Cichy, M., & Flieger, J. (2025). Application of Fourier transform infrared (FTIR) spectroscopy in characterization of green synthesized nanoparticles. *Molecules*, 30(3), 684.
- Patowary, K., Patowary, R., Kalita, M. C., & Deka, S. (2017). Characterization of Biosurfactant Produced during Degradation of Hydrocarbons Using Crude Oil As Sole Source of Carbon. *Frontiers in Microbiology*, 8, 279. <https://doi.org/10.3389/fmicb.2017.00279>.
- Purwatinigrum, H. (2018). *Formulasi dan Uji Sifat Fisik Emulsi Minyak Jarak (Oleum Ricini) dengan Perbedaan Emulgator*. (09), 1–4.
- Putri, A. R. (2024). *PENGARUH JENIS SUMBER NITROGEN PADA PRODUKSI BIOSURFAKTAN BAKTERI HALOFILIK Bacillus clausii JIG-0%B DAN APLIKASINYA PADA EX-SITU MICROBIAL*. Universitas Diponegoro. Semarang.
- Putri, D. A., Mawli, R. E., Fitriana, W. D., & Solihah, Apt. R. (2025). *Fitofarmasi: Riset Fitokimia dan Bioaktivitas Tanaman Obat Indonesia*. CV. Bintang Semesta Media. <https://books.google.co.id/books?id=lamWEQAAQBAJ>
- Redyaningsih, I. (2019). *IDENTIFIKASI MIKROORGANISME HALOFILIK JIG-0% DARI TAMBAK GARAM MADURA DAN Uji ANTIBAKTERI PIGMEN ORANYE DAN METABOLIT SEKUNDERNYA*. Universitas Diponegoro. Semarang.
- Ren, J., Li, Z., Li, X., Yang, L., Bu, Z., Wu, Y., Li, Y., Zhang, S., & Meng, X. (2025). Exploring the Mechanisms of the Antioxidants BHA, BHT, and TBHQ in Hepatotoxicity, Nephrotoxicity, and Neurotoxicity from the Perspective of Network Toxicology. *Foods*, 14(7). <https://doi.org/10.3390/foods14071095>.
- Ren, L., Yuan, Z., Xie, T., Wu, D., Kang, Q., Li, J., & Li, J. (2022). Extraction and characterization of cyclic lipopeptides with antifungal and antioxidant activities from *Bacillus amyloliquefaciens*. *Journal of Applied Microbiology*, 133(6), 3573–3584. <https://doi.org/10.1111/jam.15791>.
- Rizvi, H., Singh, V., & Ashish. (2024). Screening and Characterization of Biosurfactant-producing Strains in Contaminated Soil. *Journal of Pure and Applied Microbiology*, 18(2), 1074–1084. <https://doi.org/10.22207/JPAM.18.2.24>.
- Rohmah, S. (2019). *ISOLASI DAN IDENTIFIKASI MIKROORGANISME HALOFILIK BERPIGMEN MERAH DARI TAMBAK GARAM MADURA*

SERTA POTENSI PIGMEN MERAH SEBAGAI ANTIOKSIDAN.

Universitas Diponegoro. Semarang.

- Romero Vega, G., & Gallo Stampino, P. (2025). Bio-Based Surfactants and Biosurfactants: An Overview and Main Characteristics. *Molecules*, 30(4). <https://doi.org/10.3390/molecules30040863>.
- Saini, R. K., Prasad, P., Shang, X., & Keum, Y. S. (2021). Advances in lipid extraction methods—a review. *International Journal of Molecular Sciences*, 22(24), 1–19. <https://doi.org/10.3390/ijms222413643>.
- Samosir, S. R., Auliafendri, N., & Naibaho, M. I. (2024). Uji Efektivitas Antioksidan dari Kombinasi Ekstrak Daun Stevia (*Stevia rebaudiana* (bertoni) bertoni) dan Daun Teh Hijau (*Camellia sinensis* (L.) Kuntze) dengan Menggunakan Metode DPPH (1, 1-Difenil-2-Pikrilhidrazil). *JIFI (Jurnal Ilmiah Farmasi Imelda)*, 7(2), 105–113.
- Santos, D. K. F., Rufino, R. D., Luna, J. M., Santos, V. A., & Sarubbo, L. A. (2016). Biosurfactants: multifunctional biomolecules of the 21st century. *International journal of molecular sciences*, 17(3), 401.
- Saraiva, M. A. (2020). Interpretation of α -synuclein UV absorption spectra in the peptide bond and the aromatic regions. *Journal of Photochemistry and Photobiology B: Biology*, 212(February), 112022. <https://doi.org/10.1016/j.jphotobiol.2020.112022>.
- Sarubbo, L. A., Silva, M. da G. C., Durval, I. J. B., Bezerra, K. G. O., Ribeiro, B. G., Silva, I. A., Twigg, M. S., & Banat, I. M. (2022). Biosurfactants: Production, properties, applications, trends, and general perspectives. *Biochemical Engineering Journal*, 181(2022), 1–19. <https://doi.org/10.1016/j.bej.2022.108377>.
- Schwarze, M. (2021). Recycling of catalysts from surfactant systems. *Chemie Ingenieur Technik*, 93(1–2), 31–41.
- Shao, C., Liu, L., Gang, H., Yang, S., & Mu, B. (2015). Structural diversity of the microbial surfactin derivatives from selective esterification approach. *International Journal of Molecular Sciences*, 16(1), 1855–1872. <https://doi.org/10.3390/ijms16011855>.
- Sharma, P., Sharma, S., & Kumar, H. (2024). Introduction to ionic liquids, applications and micellization behaviour in presence of different additives. *Journal of Molecular Liquids*, 393, 123447.
- Sreenivasan, A., S, J. S. J., M, A. A., Prakash, V., & Prasobh, G. R. (2023). *Pharmaceutical Sciences Review on Qualitative and Quantitative Analysis*. 10(05), 214–226.
- Tancredi, M., Carandente Coscia, C., Russo Krauss, I., & D'Errico, G. (2025). Antioxidant Properties of Biosurfactants: Multifunctional Biomolecules with Added Value in Formulation Chemistry. *Biomolecules*, 15(2), 308.
- Umar, A., Zafar, A., Wali, H., Siddique, M. P., Qazi, M. A., Naeem, A. H., Malik, Z. A., & Ahmed, S. (2021). Low-cost production and application of lipopeptide for bioremediation and plant growth by *Bacillus subtilis* SNW3. *AMB Express*, 11(1), 165.

- Wang, Y., Shen, J., Zou, B., Zhang, L., Xu, X., & Wu, C. (2023). Determination of the critical pH for unfolding water-soluble cod protein and its effect on encapsulation capacities. *Food Research International*, 174, 113621. <https://doi.org/https://doi.org/10.1016/j.foodres.2023.113621>.
- Widiasriani, I. A. P., Udayani, N. N. W., Triansyah, G. A. P., Dewi, N. P. E. M. K., Wulandari, N. L. W. E., & Prabandari, A. A. S. S. (2024). Artikel Review: Peran Antioksidan Flavonoid dalam Menghambat Radikal Bebas. *Journal Syifa Sciences and Clinical Research*, 6(2).
- Yang, N., Wu, Q., & Xu, Y. (2020). Fe nanoparticles enhanced surfactin production in *Bacillus amyloliquefaciens*. *ACS omega*, 5(12), 6321–6329.
- Yuliani, N. Ms. Am. Sb. Ss. Ms. (2023). *Antioksidan dan stres oksidatif*. UAD PRESS.
- Zhang, Y. M., Qiao, B., Shang, W., Ding, M. Z., Xu, Q. M., Duan, T. X., & Cheng, J. S. (2024). Improving salt-tolerant artificial consortium of *Bacillus amyloliquefaciens* for bioconverting food waste to lipopeptides. *Waste Management*, 181(December 2023), 89–100. <https://doi.org/10.1016/j.wasman.2024.04.006>.
- Zhao, X. N., Liu, Y., Niu, L. Y., & Zhao, C. P. (2012). Spectroscopic studies on the interaction of bovine serum albumin with surfactants and apigenin. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 94, 357–364. <https://doi.org/10.1016/j.saa.2012.02.078>.