

References

- Adetiloye, O. A., Nwodo, U. U., Nwachukwu, I. N., & Nwanze, J. C. (2025). Optimization of thermostable amylolytic enzyme production from *Bacillus cereus* isolated from a recreational warm spring via Box Behnken design and response surface methodology. *Microbial Cell Factories*, 24(1). <https://doi.org/10.1186/s12934-025-02709-w>
- Ali, M. F., Ahmed, M. A., Hossain, M. S., Ahmed, S., & Sarwaruddin Chowdhury, A. (2022). Effects of inorganic materials on the waste chicken feather fiber reinforced unsaturated polyester resin-based composite: An approach to environmental sustainability. *Composites Part C: Open Access*, 9, 100320. <https://doi.org/10.1016/j.jcomc.2022.100320>
- Belarmino, D., Ladchumananandasivam, R., Belarmino, L., Pimentel, J., da Rocha, B., Galvão, A., & de Andrade, S. (2012). Physical and morphological structure of chicken feathers (keratin biofiber) in natural, chemically and thermally modified forms. *Materials Sciences and Applications*, 3(12), 887–893. <https://doi.org/10.4236/msa.2012.312129>
- Bragulla, H. H., & Homberger, D. G. (2009). Structure and functions of keratin proteins in simple, stratified, keratinized and cornified epithelia. *Journal of Anatomy*, 214(4), 516–559. <https://doi.org/10.1111/j.1469-7580.2009.01066.x>
- Chou, C., & Buehler, M. J. (2012). Structure and mechanical properties of human trichocyte keratin intermediate filament protein. *Biomacromolecules*, 13(11), 3522–3532. <https://doi.org/10.1021/bm301254u>
- Dong, Y., Chang, W., & Chen, P. T. (2017). Characterization and overexpression of a novel keratinase from *Bacillus polyfermenticus* B4 in recombinant *Bacillus subtilis*. *Bioresources and Bioprocessing*, 4(1). <https://doi.org/10.1186/s40643-017-0177-1>

- El Salamony, D. H., Hassouna, M. S. E., Zaghloul, T. I., & Abdallah, H. M. (2024). Valorization of chicken feather waste using recombinant *Bacillus subtilis* cells by solid-state fermentation for soluble proteins and serine alkaline protease production. *Bioresource Technology*, 393, 130110. <https://doi.org/10.1016/j.biortech.2023.130110>
- Evans, K. L., Crowder, J., & Miller, E. S. (2000). Subtilisins of *Bacillus* spp. hydrolyze keratin and allow growth on feathers. *Canadian Journal of Microbiology*, 46(11), 1004–1011. <https://doi.org/10.1139/w00-085>
- Gül Çelik, M., Yilmaz, M. T., & Karaman, S. (2021). Valorization of chicken feather waste: Fabrication of keratin-chitosan biofilms. *ChemistrySelect*, 6(9), 2189–2197. <https://doi.org/10.1002/slct.202100085>
- Hernandez, A. M., France, D. M., Biran, R., & Fenton, R. A. (2005). Microstructural characterisation of keratin fibres from chicken feathers. *International Journal of Environment and Pollution*, 23(2), 162–178. <https://doi.org/10.1504/ijep.2005.006858>
- Kan, J., Yang, Q., Zhao, X., Jin, C., & Xu, H. (2020). Study of mechanisms of recombinant keratin solubilization with enhanced wound healing capability. *Chemistry of Materials*, 32(7), 3122–3133. <https://doi.org/10.1021/acs.chemmater.0c00124>
- Kucinska, J. K., Czekala, W., Kuboń, M., & Pawłowski, A. (2014). Bioefficacy of hen feather keratin hydrolysate and compost on vegetable plant growth. *Compost Science & Utilization*, 22(3), 179–187. <https://doi.org/10.1080/1065657x.2014.918866>
- Lai, Y., Wu, X., Li, W., & Wang, L. (2023). Insights into the keratin efficient degradation mechanism mediated by *Bacillus* sp. CN2 based on integrating functional degradomics. *Biotechnology for Biofuels and Bioproducts*, 16, 59. <https://doi.org/10.1186/s13068-023-02308-0>

Lange, L., Huang, Y., & Busk, P. K. (2016). Microbial decomposition of keratin in nature—A new hypothesis of industrial relevance. *Applied Microbiology and Biotechnology*, 100(5), 2083–2096. <https://doi.org/10.1007/s00253-015-7262-1>

McKittrick, J., Chen, P.-Y., Bodde, S. G., Yang, W., Novitskaya, E. E., & Meyers, M. A. (2012). The structure, functions, and mechanical properties of keratin. *JOM*, 64(4), 449–468. <https://doi.org/10.1007/s11837-012-0302-8>

Mokrejs, P., Svoboda, P., Janacova, D., Hrbackova, M., & Kolomaznik, K. (2017). The cosmetic and dermatological potential of keratin hydrolysate. *Journal of Cosmetic Dermatology*, 16(4), 512–519. <https://doi.org/10.1111/jocd.12319>

Patil, R., Wagh, C., & Kavathekar, B. (2019). Microbial degradation of keratin waste: A review.

Peng, Z., Wang, L., Liu, X., Wang, Y., & Zhang, Y. (2019). Keratin waste recycling based on microbial degradation: Mechanisms and prospects. *ACS Sustainable Chemistry & Engineering*, 7(11), 9727–9736. <https://doi.org/10.1021/acssuschemeng.9b01527>

Prakash, P., Jayalakshmi, S. K., & Sreeramulu, K. (2010). Purification and characterization of extreme alkaline, thermostable keratinase, and keratin disulfide reductase produced by *Bacillus halodurans* PPKS-2. *Applied Microbiology and Biotechnology*, 87(2), 625–633. <https://doi.org/10.1007/s00253-010-2499-1>

Qiu, J., Wilkens, C., Barrett, K., & Meyer, A. S. (2020). Microbial enzymes catalyzing keratin degradation: Classification, structure, function. *Biotechnology Advances*, 44, 107607. <https://doi.org/10.1016/j.biotechadv.2020.107607>

Shavandi, A., Silva, T. H., Bekhit, A. A., & Bekhit, A. E.-D. (2016). Evaluation of keratin extraction from wool by chemical methods for bio-polymer application. *Journal of Bioactive and Compatible Polymers*, 32(2), 163–177. <https://doi.org/10.1177/0883911516662069>

Shestakova, A., Timorshina, S., & Osmolovskiy, A. (2020). Biodegradation of keratin-rich husbandry waste as a path to sustainable agriculture. *Sustainability*, 13(16), 8691. <https://doi.org/10.3390/su13168691>

Tesfaye, T., Sithole, B., Ramjugernath, D., & Chunilall, V. (2017). Valorisation of chicken feathers: Characterisation of chemical properties. *Waste Management*, 68, 626–635. <https://doi.org/10.1016/j.wasman.2017.06.050>

van Dijk, J. M., & Hecker, M. (2013). *Bacillus subtilis*: From soil bacterium to super-secreting cell factory. *Microbial Cell Factories*, 12(1), 3. <https://doi.org/10.1186/1475-2859-12-3>

Wang, Z., Lu, B., Xiao, N., Guo, S., Liu, C., & Ai, M. (2024). Structural and functional assessment of keratin extracted from chicken feathers using microwave-assisted L-cysteine method. *Food Bioscience*, 61, 104712. <https://doi.org/10.1016/j.fbio.2024.104712>

Yong, B., Liu, H., Yu, W., Xie, J., & Liu, J. (2020). Recombinant expression and biochemical characterization of a novel keratinase BsKER71 from feather degrading bacterium *Bacillus subtilis* S1-4. *AMB Express*, 10(1). <https://doi.org/10.1186/s13568-019-0939-6>

Zhou, B., Xu, H., Zhang, H., Xie, Y., Li, Y., & Zeng, Y. (2023). Comprehensive insights into the mechanism of keratin degradation and exploitation of keratinase to enhance the bioaccessibility of soybean protein. *Biotechnology for Biofuels and Bioproducts*, 16(1). <https://doi.org/10.1186/s13068-023-02426-9>