



Agricultural University of Athens
Department of Food Science and Human Nutrition
Laboratory of Food Process Engineering

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Location

A) Rooms

The laboratories, the warehouses and offices of the Laboratory of Food Process Engineering are located at the basement and ground floor of the Hasioti's and the Green Amphitheatres' building and occupies an area of approximately 500 m².





Modules

- [Food Product Development](#)
- [Principles of Food Engineering](#)
- [Unit Operations in Food Processing](#)
- [Computer Applications in Food Processing](#)
- [Food Preservation](#)
- [Food Packaging](#)
- [Food Plant Design](#)
- [Physical Properties of Foods](#)
- [Technology of Foods of Plant and Animal Origin](#)
- [Laboratory of Food Engineering](#)

Research

The Research Strategy of the Laboratory of Food Process Engineering includes:

- Support and implementation of original and applied research based on state of the art scientific knowledge of the design, application and control of food processing and preservation technologies, and mathematical modelling. Emphasis is given in solving open problems.
- Enhancing scientific excellence by conducting doctoral dissertations and providing original, innovative knowledge and highquality educational activities, having a significant impact on regional and global development.
- Creation of adequate research environment and faculty facilities for the support and dissemination of research and knowledge exploitation activities.
- Emphasis on research that contributes to technological and economic development in key areas, such as bioeconomy and blue growth.
- Competitive research funds from international and national organizations and effective synergies with the private sector and food industry for providing the highest level of innovations.

The research activities of the Laboratory of Food Process Engineering lie within the following:

- Design and optimization of food processing and preservation
- Mathematical modelling of changes and processes related to food products.
- Study of physical properties of foods (rheological properties, color, macro- and micro-structure properties) and sensory parameters, with the aim to provide inter-correlations and define optimized methods of their measurement and utilization. Application on the design and development of improved food products (formulation engineering).
- Application of size reduction technologies in micro- and nano-scale and investigation of the physical properties of the obtained structures with applications on flour for bakery products and nano-emulsions.
- Food packaging (enhancing safety and extending shelf life of food products).
- Biorefinery development using food industry waste and by-product streams and sustainability assessment
- Bioprocess and food process design in the bio-economy era following circular economy practices.
- Sustainable bioprocess engineering and development for the production of bio-based and biodegradable polymers for food packaging applications, biomaterials, bio-colorants and food additives.

Research Programs - INTERNATIONAL, EUROPEAN & NATIONAL (2021)

1. Ecofriendly multipurpose biobased products from municipal biowaste (LIFE EBP), Project granted by the Executive Agency for Small and Medium-sized Enterprises (EASME) LIFE Environmental and Resource Efficiency, LIFE19 ENV/IT/000004. 2020-2024. (A. Koutinas).
2. Enhancing diversity in Mediterranean cereal farming systems (CerealMed), PRIMA, Call: Multi-topic 2019, General Secretariat of Research and Technology (GSRT), 2020-2023. (A. Koutinas).
3. ICHTHYS: Optimization of novel value CHains for fish and seafood by developing an integrated sustainable approach for improved quality, safety and waste reduction. MSCA-RISE-2019 (2020-2023) (Th.Tsironi).
4. FRUALGAE: Sustainable technologies and methodologies to improve quality and extend product shelf life in the Mediterranean agro-food supply chain. PRIMA-2019 (2020-2023) (Th.Tsironi).
5. Production of sustainable biofuels and value-added products from municipal organic solid wastes of catering services (Brew2Bio, MIS 5071807), Research-Create-Innovate, GSRT, 2020-2023. (A. Koutinas).
6. Valorization of sugar-beet cultivation residues and by-products of sugar manufacturing process for the production of bio-based and biocomposite biodegradable packaging materials (Beet2Bioref, MIS 5069983), Research-Create-Innovate, GSRT, 2020-2023. (A. Koutinas).
7. Development of innovative nanocellulose-reinforced composite wood products with advanced hydrophobic and antimicrobial properties (CELL4GLUE, MIS 5056216), GSRT, 2020-2023. (A. Koutinas).
8. Development and demonstration of key technologies for industrializable polyhydroxyalkanoates production from industrial and environmental waste streams (WASTES2PLASTICS, T7ΔKI-00100), China – Greece Bilateral R&D Cooperation, GSRT, 2019-2022. (A. Koutinas).
9. Establishment of a pan-european network on the sustainable valorisation of lignin (LignoCOST) (COST Action CA17128). 2018-2022. (A. Koutinas).
10. Exploitation of cactus pear fruit and leaves focusing on innovative food applications Opuntia to new product development «ΕΠΕΥΝΩ – ΔΗΜΙΟΥΡΓΩ – ΚΑΙΝΟΤΟΜΩ», co-funded by EPANEK in the frame of ESPA2014-2020, total budget: 460.000 € (2018-2021) (I. Mantala).
11. State Scholarship “Reinforcement of Postdoctoral Researchers - 2nd Cycle” (MIS-5033021), implemented by the State Scholarships Foundation (IKY) for the project “Exploitation of Greek wheat landraces for value added bread and pasta development” Mentor of Dr. Styliani Protonotariou (I. Mantala).
12. Operational Programme "Competitiveness, Entrepreneurship and Innovation" (NSRF 2014-2020), Research Infrastructure on Food Bioprocessing Development and

Innovation Exploitation – Acronym: FOOD INNOVATION R (2018-2021) (I. Mantala, A.Koutinas).

13. Exploitation of food industry by-products for the production of biogenic biodegradable active food packaging (BIOΣΤΡΟΦΗ), Research-Create-Innovate, GSRT, 2018-2021. (A. Koutinas).
14. Bioconversion of food industry wastes to biopolymers for packaging applications in a biorefinery concept (Wastes-to-Biopolymers), Research-Create-Innovate, GSRT, 2018-2021. (A. Koutinas).
15. Research Infrastructure for Waste Valorization and Sustainable Management of Resources (INVALOR) Operational Programme "Competitiveness, Entrepreneurship and Innovation" (NSRF 2014-2020), 2017-2021. (A. Koutinas).

PUBLICATIONS

Book chapters (International Editions) (2020)

1. Oreopoulou V., Tsironi T. (2021) Plant Antioxidants and Antimicrobials in Edible and Non-edible Active Packaging Films. In: Ekiert H.M., Ramawat K.G., Arora J. (eds) Plant Antioxidants and Health. Reference Series in Phytochemistry. Springer, Cham. https://doi.org/10.1007/978-3-030-45299-5_29-1
2. Jafari S.M., Fathi M., Mandala I. (2021). Part III, Chapter 13- Emerging product formation. In C.M. Galanakis (Ed.), Food Waste Recovery- Processing Technologies and Industrial Techniques, 2nd edition Academic Press, Elsevier, ISBN-10: 0128205636.
3. Briassoulis D., Koutinas A.A., Gołaszewski B.J., Pikasi A., Ladakis D., Hiskakis M., Tsakona M. (2020). Techno-economic sustainability assessment: Methodological approaches for biobased products. In: Transition Towards a Sustainable Biobased Economy, The Royal Society of Chemistry, Chapter 4, pp. 80-132.
4. Ladakis D., Papapostolou H., Vlysidis A., Koutinas A. (2020). Inventory of food processing side streams in EU and prospects for biorefinery development. In: Food Industry Waste - Assessment and Recuperation of Commodities, 2nd Edition, Elsevier, Chapter 9.
5. Mandala I., Apostolidis E. (2020). Rheological characterization of liquid nanoencapsulated food ingredients by viscometers. In: Nanoencapsulation in the food industry, Vol. 4, Characterization of Nanoencapsulated Food Ingredients, (S. M. Jafari Ed.) Chapter 15, pp. 529-545, 2020, <https://doi.org/10.1016/B978-0-12-815667-4.00015-8>.

Articles in International Scientific Journals (2020)

1. Tsironi T., Koutinas A., Mandala I., Stoforos N.G. (2021). Current and new Green Deal solutions for sustainable food processing. Current Opinion in Environmental Science & Health <https://doi.org/10.1016/j.coesh.2021.100244>.
2. Kachrimanidou, V., Ioannidou, S-M., Ladakis, D., Papapostolou, H., Kopsahelis, N., Koutinas, A.A., Kookos, I.K. (2021). Techno-economic evaluation and life-cycle assessment of poly(3-hydroxybutyrate) production within a biorefinery concept using

- sunflower-based biodiesel industry by-products. *Bioresource Technology* 326, 124711.
3. Tsouko, E., Papadaki, A., Papanikolaou, S., Danezis, G.P., Georgiou, C.A., Freire, D.M.G., Koutinas, A. (2021). Enzymatic production of isopropyl and 2-ethylhexyl esters using γ -linolenic acid rich fungal oil produced from spent sulphite liquor. *Biochemical Engineering Journal* 169, 107956.
 4. Carmona-Cabello, M., García, I.L., Papadaki, A., Tsouko, E., Koutinas, A., Dorado, M.P. (2021). Biodiesel production using microbial lipids derived from food waste discarded by catering services. *Bioresource Technology* 323, 124597.
 5. Tsironi T.N., Stoforos N.G., Taoukis P.S. (2020). Quality and shelf life modeling of frozen fish at constant and variable temperature conditions. *Foods*, 9, 1893.
 6. Ntzimani A., Angelakopoulos R., Semenoglou I., Dermesonlouoglou E., Tsironi T., Moutou K. & Taoukis P. (2021). Slurry ice as an alternative cooling medium for fish harvesting and transportation: Study of the effect on seabass flesh quality and shelf life. *Aquaculture and Fisheries* <https://doi.org/10.1016/j.aaf.2021.01.006>
 7. Giannoglou, M., Stergiou, P., Dimitrakellis, P., Gogolides, E., Stoforos, N., Katsaros, G. (2020). Effect of Cold Atmospheric Plasma processing on quality and shelf-life of ready-to-eat rocket leafy salad. *Innovative Food Science & Emerging Technologies* 66, 102502.
 8. Apostolidis, E., & Mandala, I. (2020). Modification of resistant starch nanoparticles using high-pressure homogenization treatment. *Food Hydrocolloids* 103 doi:10.1016/j.foodhyd.2020.105677.
 9. Aroniada M., Maina S., Koutinas A., Kookos I.K. (2020). Estimation of volumetric mass transfer coefficient (kLa)—Review of classical approaches and contribution of a novel methodology. *Biochemical Engineering Journal* 155, 107458.
 10. Bonatsos N., Marazioti C., Moutousidi E., Anagnostou A., Koutinas A., Kookos I.K. (2020). Techno-economic analysis and life cycle assessment of heterotrophic yeast-derived single cell oil production process. *Fuel* 264, 116839.
 11. Boviatsi E., Papadaki A., Efthymiou M.-N., Nychas G.-J.E., Papanikolaou S., da Silva J.A.C., Freire D.M.G., Koutinas A. (2020). Valorisation of sugarcane molasses for the production of microbial lipids via fermentation of two *Rhodosporidium* strains for enzymatic synthesis of polyol esters. *Journal of Chemical Technology and Biotechnology* 95:402-407.
 12. Carmona-Cabello M., García I.L., Sáez-Bastante J., Pinzi S., Koutinas A.A., Dorado M.P. (2020). Food waste from restaurant sector – Characterization for biorefinery approach. *Bioresource Technology* 301, 122779.
 13. Dheskali E., Koutinas A.A., Kookos I.K. (2020). Risk assessment modeling of bio-based chemicals economics based on Monte-Carlo simulations. *Chemical Engineering Research and Design* 163: 273-280.
 14. Dheskali E., Koutinas A.A., Kookos I.K. (2020). A simple and efficient model for calculating fixed capital investment and utilities consumption of large-scale biotransformation processes. *Biochemical Engineering Journal* 154, 107462.

15. Diamantopoulou, P., Stoforos, N.G., Xenopoulos, E., Sarris, D., Psarianos, D., Philippoussis, A., and Papanikolaou, S. (2020). Lipid production by *Cryptococcus curvatus* growing on commercial xylose and subsequent valorization of fermentation waste-waters for the production of edible and medicinal mushrooms. *Biochemical Engineering Journal* 162, 107706, doi: <https://doi.org/10.1016/j.bej.2020.107706>.
16. Giannakourou M.C., Stavropoulou N., Tsironi T., Lougovois V., Kyrana V., Konteles S.J., Sinanoglou V.J. (2020). Application of hurdle technology for the shelf life extension of European eel (*Anguilla anguilla*) fillets. *Aquaculture and Fisheries* (Accepted, in press).
17. Giannoglou, M., Stergiou, P., Dimitrakellis, P., Gogolides, E., Stoforos, N.G., and Katsaros, G. (2020). Effect of Cold Atmospheric Plasma processing on quality and shelf-life of ready-to-eat rocket leafy salads. *Innovative Food Science and Emerging Technologies* 66, 102502, doi: <https://doi.org/10.1016/j.ifset.2020.102502>.
18. Ioannidou S.M., Pateraki C., Ladakis D., Papapostolou H., Tsakona M., Vlysidis A., Kookos I.K., Koutinas A. (2020). Sustainable production of bio-based chemicals and polymers via integrated biomass refining and bioprocessing in a circular bioeconomy context. *Bioresource Technology* 307, 123093.
19. Kaminiaris M.D., Mavriku S., Georgiadou M., Paivana G., Tsitsigiannis D.I., Kintzios S. (2020). An Impedance Based Electrochemical Immunosensor For Aflatoxin B1 Monitoring in Pistachio Matrices. *Chemosensors*, 8, 121 doi:10.3390/chemosensors8040121.
20. Kotzamanis Y., Kumar V., Tsironi T., Grigorakis K., Ilia V., Vatsos I., Brezas A., van Eys J., Gisbert E. (2020). Taurine supplementation in high-soy diets affects fillet quality of European sea bass (*Dicentrarchus labrax*). *Aquaculture*, 520, 734655.
21. Kotzamanis Y., Tsironi T., Brezas A., Grigorakis K., Ilia V., Vatsos I., Romano N., van Eys J., Kumar V. (2020). High taurine supplementation in plant protein-based diets improves growth and organoleptic characteristics of European seabass (*Dicentrarchus labrax*). *Scientific Reports* 10, 12294.
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23. Papadaki A., Kopsahelis N., Freire D.M.G., Mandala I., Koutinas A.A. (2020). Olive oil oleogel formulation using wax esters derived from soybean fatty acid distillate. *Biomolecules* 10(1),106
24. Papadaki, A., Kopsahelis, N., Freire, D. M. G., Mandala, I., & Koutinas, A. A. (2020). Olive oil oleogel formulation using wax esters derived from soybean fatty acid distillate. *Biomolecules* 10(1) doi:10.3390/biom10010106.
25. Papanikolaou, S., Diamantopoulou, P., Blanchard, F., Lambrinea, E., Chevalot, I., Stoforos, N.G., and Rondags, E. (2020). Physiological characterization of a novel wild-type *Yarrowia lipolytica* strain grown on glycerol: effects of cultivation conditions and mode on polyols and citric acid production. *Applied Sciences* 10, 7373, <https://doi.org/10.3390/app10207373>.

26. Paximada, P., Kanavou, E., & Mandala, I. G. (2020). Effect of rheological and structural properties of bacterial cellulose fibrils and whey protein biocomposites on electrosprayed food-grade particles. *Carbohydrate Polymers* 241 doi:10.1016/j.carbpol.2020.116319.
27. Protonotariou S. Ritzoulis C., Mandala I. (2020) Jet milling conditions impact on wheat flour particle size. *Journal of Food Engineering* (revised).
28. Protonotariou, S., Stergiou, P., Christaki, M., & Mandala, I. G. (2020). Physical properties and sensory evaluation of bread containing micronized whole wheat flour. *Food Chemistry* 318 doi:10.1016/j.foodchem.2020.126497.
29. Semenoglou I., Dimopoulos G., Tsironi T., Taoukis P. (2020). Mathematical modelling of the effect of solution concentration and the combined application of pulsed electric fields on mass transfer during osmotic dehydration of sea bass fillets. *Food and Bioproducts Processing*, 121, 186-192.
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31. Stylianou E., Pateraki C., Ladakis D., Cruz-Fernández M., Latorre-Sánchez M., Coll C., Koutinas A. (2020). Evaluation of organic fractions of municipal solid waste as renewable feedstock for succinic acid production. *Biotechnology for Biofuels* 13(1), 72.
32. Tsironi T., Houhoula D., Taoukis P. (2020). Hurdle technology for fish preservation. *Aquaculture and Fisheries*, 5(2), 65-71.
33. Tsouko E., Maina S., Ladakis D., Kookos I.K., Koutinas A. (2020). Integrated biorefinery development for the extraction of value-added components and bacterial cellulose production from orange peel waste streams. *Renewable Energy* 160: 944-954.
34. Tsouko E., Papadaki A., Papapostolou H., Ladakis D., Natsia A., Koutinas A., Kampioti A., Eriotou E., Kopsahelis N. (2020). Valorization of Zante currant side-streams for the production of phenolic-rich extract and bacterial cellulose: a novel biorefinery concept. *Journal of Chemical Technology and Biotechnology* 95:427-438.
35. Valasi L., Georgiadou M., Tarantilis P.A., Yanniotis S., Pappas C.S. (2020). Rapid screening on aflatoxins' presence in *Pistachia vera* nuts using diffuse reflectance infrared Fourier transform spectroscopy and chemometrics. *Journal of Food Science & Technology*. <https://doi.org/10.1007/s13197-020-04549-5>.
36. Valasi L., Arvanitaki D., Mitropoulou A., Georgiadou M., Pappas C.S. (2020). Study of the Quality Parameters and the Antioxidant Capacity for the FTIR-Chemometric Differentiation of *Pistacia vera* Oils. *Molecules* 25(7), 1614. <https://doi.org/10.3390/molecules25071614>.
37. Xenopoulos E., Giannikakis I., Chatzifragkou A., Koutinas A., Papanikolaou S. (2020). Lipid production by yeasts growing on commercial xylose in submerged cultures with process water being partially replaced by olive mill wastewaters. *Processes* 8(7), 819.