

References: 3D printing technologies in the food system for food production and packaging

Agunbiade, A. O., Song, L., Agunbiade, O. J., Ofoedu, C. E., Chacha, J. S., Duguma, H. T., Hossaini, S. M., Rasaq, W. A., Shorstkii, I., Osuji, C. M., Owuamanam, C. I., Okpala, C. O. R., Korzeniowska, M., & Guine, R. P. F. (2022). Potentials of 3D extrusion-based printing in resolving food processing challenges: A perspective review. *Journal of Food Process Engineering*, 45(4). <https://doi.org/10.1111/jfpe.13996>

ASTM International. (2022). ASTM ISO/ASTM52900-21 [Additive manufacturing — General principles — Fundamentals and vocabulary](#).

Autonomous Manufacturing. (2020). [How 3D Printing Transforms the Food and Beverage Industry](#).

Azzollini, D., Derossi, A., Fogliano, V., Lakemond, C. M. M., & Severini, C. (2018). Effects of formulation and process conditions on microstructure, texture and digestibility of extruded insect-riched snacks. *Innovative Food Science & Emerging Technologies*, 45, 344–353. <https://doi.org/10.1016/j.ifset.2017.11.017>

Baiano, A. (2022). 3D Printed Foods: A Comprehensive Review on Technologies, Nutritional Value, Safety, Consumer Attitude, Regulatory Framework, and Economic and Sustainability Issues. *Food Reviews International*, 38(5), 986–1016. <https://doi.org/10.1080/87559129.2020.1762091>

Bedoya, M. G., Montoya, D. R., Tabilo-Munizaga, G., Pérez-Won, M., & Lemus-Mondaca, R. (2022). Promising perspectives on novel protein food sources combining artificial intelligence and 3D food printing for food industry. *Trends in Food Science & Technology*, 128, 38–52. <https://doi.org/10.1016/j.tifs.2022.05.013>

Brunner, T. A., Delley, M., & Denkel, C. (2018). Consumers' attitudes and change of attitude toward 3D-printed food. *Food Quality and Preference*, 68, 389–396. <https://doi.org/10.1016/j.foodqual.2017.12.010>

Cao, Y., & Mezzenga, R. (2020). Design principles of food gels. *Nature Food*, 1(2), 106–118. <https://doi.org/10.1038/s43016-019-0009-x>

Caulier, S., Doets, E., & Noort, M. (2020). An exploratory consumer study of 3D printed food perception in a real-life military setting. *Food Quality and Preference*, 86, 104001. <https://doi.org/10.1016/j.foodqual.2020.104001>

Chen, C., Zhang, M., Guo, C., & Chen, H. (2021). 4D printing of lotus root powder gel: Color change induced by microwave. *Innovative Food Science & Emerging Technologies*, 68, 102605. <https://doi.org/10.1016/j.ifset.2021.102605>

Chow, C. Y., Thybo, C. D., Sager, V. F., Riantiningtyas, R. R., Bredie, W. L. P., & Ahrné, L. (2021). Printability, stability and sensory properties of protein-enriched 3D-printed lemon mousse for personalised in-between meals. *Food Hydrocolloids*, 120, 106943.

<https://doi.org/10.1016/j.foodhyd.2021.106943>

Cotabarren, I. M., & Palla, C. A. (2022). Development of functional foods by using 3D printing technologies: application to oxidative stress and inflammation-related affections. In *Current Advances for Development of Functional Foods Modulating Inflammation and Oxidative Stress* (pp. 33–55). Elsevier. <https://doi.org/10.1016/B978-0-12-823482-2.00009-1>

Creativemachines Lab. (2022). [Digital Food](#).

Derossi, A., Caporizzi, R., Paolillo, M., Oral, M. O., & Severini, C. (2021). Drawing the scientific landscape of 3D Food Printing. Maps and interpretation of the global information in the first 13 years of detailed experiments, from 2007 to 2020. *Innovative Food Science & Emerging Technologies*, 70, 102689. <https://doi.org/10.1016/j.ifset.2021.102689>

Dey, S., Hettiarachchy, N., Bisly, A. A., Luthra, K., Atungulu, G. G., Ubeyitogullari, A., & Mozzoni, L. A. (2022). Physical and textural properties of functional edible protein films from soybean using an innovative 3D printing technology. *Journal of Food Science*, 87(11), 4808–4819. <https://doi.org/10.1111/1750-3841.16349>

Diañez, I., Gallegos, C., Brito-de la Fuente, E., Martínez, I., Valencia, C., Sánchez, M. C., & Franco, J. M. (2021). Implementation of a novel continuous solid/liquid mixing accessory for 3D printing of dysphagia-oriented thickened fluids. *Food Hydrocolloids*, 120, 106900. <https://doi.org/10.1016/j.foodhyd.2021.106900>

Diañez, Isabel, Martínez, I., Franco, J. M., Brito-de la Fuente, E., & Gallegos, C. (2022). *Advances in 3D printing of food and nutritional products* (pp. 173–210). <https://doi.org/10.1016/bs.afnr.2021.12.003>

Dick, A., Bhandari, B., & Prakash, S. (2019). Post-processing feasibility of composite-layer 3D printed beef. *Meat Science*, 153, 9–18. <https://doi.org/10.1016/j.meatsci.2019.02.024>

Donn, P., Prieto, M. A., Mejuto, J. C., Cao, H., & Simal-Gandara, J. (2022). Functional foods based on the recovery of bioactive ingredients from food and algae by-products by emerging extraction technologies and 3D printing. *Food Bioscience*, 49, 101853. <https://doi.org/10.1016/j.fbio.2022.101853>

Enfield, R. E., Pandya, J. K., Lu, J., McClements, D. J., & Kinchla, A. J. (2022). The future of 3D food printing: Opportunities for space applications. *Critical Reviews in Food Science and Nutrition*, 1–14. <https://doi.org/10.1080/10408398.2022.2077299>

Everett, H. (2021). [Columbia engineers cook 3D printed chicken with robotic lasers](#).

Fahmy, A. R., Amann, L. S., Dunkel, A., Frank, O., Dawid, C., Hofmann, T., Becker, T., & Jekle, M. (2021). Sensory design in food 3D printing – Structuring, texture modulation, taste localization, and thermal stabilization. *Innovative Food Science & Emerging Technologies*, 72, 102743. <https://doi.org/10.1016/j.ifset.2021.102743>

Feng, X., Khemacheevakul, K., De León Siller, S., Wolodko, J., & Wismer, W. (2022). Effect of Labelling and Information on Consumer Perception of Foods Presented as 3D Printed. *Foods*, 11(6), 809. <https://doi.org/10.3390/foods11060809>

Gebhardt, A., Kessler, J., & Thurn, L. (2018). *3D Printing: Understanding Additive Manufacturing*. Hanser Publications.

Ghazal, A. F., Zhang, M., Bhandari, B., & Chen, H. (2021). Investigation on spontaneous 4D changes in color and flavor of healthy 3D printed food materials over time in response to external or internal pH stimulus. *Food Research International*, 142, 110215.

<https://doi.org/10.1016/j.foodres.2021.110215>

Ghazal, A. F., Zhang, M., & Liu, Z. (2019). Spontaneous Color Change of 3D Printed Healthy Food Product over Time after Printing as a Novel Application for 4D Food Printing. *Food and Bioprocess Technology*, 12(10), 1627–1645. <https://doi.org/10.1007/s11947-019-02327-6>

Ghazal, A. F., Zhang, M., Mujumdar, A. S., & Ghamry, M. (2022). Progress in 4D/5D/6D printing of foods: applications and R&D opportunities. *Critical Reviews in Food Science and Nutrition*, 1–24. <https://doi.org/10.1080/10408398.2022.2045896>

Godoi, F., Bhandari, B., & Prakash, sangeeta. (2018). *Fundamentals of 3D Food Printing and Applications* (1st ed.).

Godoi, F. C., Bhandari, B. R., Prakash, S., & Zhang, M. (2019). An Introduction to the Principles of 3D Food Printing. In *Fundamentals of 3D Food Printing and Applications* (pp. 1–18). Elsevier. <https://doi.org/10.1016/B978-0-12-814564-7.00001-8>

Guo, C., Zhang, M., & Bhandari, B. (2019). Model Building and Slicing in Food 3D Printing Processes: A Review. *Comprehensive Reviews in Food Science and Food Safety*, 18(4), 1052–1069. <https://doi.org/10.1111/1541-4337.12443>

Guo, C., Zhang, M., & Devahastin, S. (2021). Color/aroma changes of 3D-Printed buckwheat dough with yellow flesh peach as triggered by microwave heating of gelatin-gum Arabic complex coacervates. *Food Hydrocolloids*, 112, 106358. <https://doi.org/10.1016/j.foodhyd.2020.106358>

Hao, L., Mellor, S., Seaman, O., Henderson, J., Sewell, N., & Sloan, M. (2010). Material characterisation and process development for chocolate additive layer manufacturing. *Virtual and Physical Prototyping*, 5(2), 57–64. <https://doi.org/10.1080/17452751003753212>

Haschick, J. (2018). 3-D Printing in the Food Packaging Industry. [Food Technology Magazine](#).

He, A., & Centre for International Governance Innovation. (2021). [What Do China's High Patent Numbers Really Mean?](#)

He, C., Zhang, M., & Guo, C. (2020). 4D printing of mashed potato/purple sweet potato puree with spontaneous color change. *Innovative Food Science & Emerging Technologies*, 59, 102250. <https://doi.org/10.1016/j.ifset.2019.102250>

Jayaprakash, S., Paasi, J., Pennanen, K., Flores Ituarte, I., Lille, M., Partanen, J., & Sozer, N. (2020). Techno-Economic Prospects and Desirability of 3D Food Printing: Perspectives of Industrial Experts, Researchers and Consumers. *Foods*, 9(12), 1725. <https://doi.org/10.3390/foods9121725>

Johansson, M., Nilsson, K., Knab, F., & Langton, M. (2022). Faba Bean Fractions for 3D Printing of Protein-, Starch- and Fibre-Rich Foods. *Processes*, 10(3), 466. <https://doi.org/10.3390/pr10030466>

K. Handral, H., Hua Tay, S., Wan Chan, W., & Choudhury, D. (2022). 3D Printing of cultured meat products. *Critical Reviews in Food Science and Nutrition*, 62(1), 272–281. <https://doi.org/10.1080/10408398.2020.1815172>

Keating, K. (2018). [3D Printing and Food Packaging Design: What the Future Holds](#). [WeListen](#)

Khodeir, M., Rouaud, O., Ogé, A., Jury, V., Le-Bail, P., & Le-Bail, A. (2021). Study of continuous cake pre-baking in a rectangular channel using ohmic heating. *Innovative Food Science & Emerging Technologies*, 67, 102580. <https://doi.org/10.1016/j.ifset.2020.102580>

Kouzani, A. Z., Adams, S., J. Whyte, D., Oliver, R., Hemsley, B., Palmer, S., & Balandin, S. (2017). 3D Printing of Food for People with Swallowing Difficulties. *KnE Engineering*, 2(2), 23. <https://doi.org/10.18502/keg.v2i2.591>

León?Bravo, V., Moretto, A., Cagliano, R., & Caniato, F. (2019). Innovation for sustainable development in the food industry: Retro and forward?looking innovation approaches to improve quality and healthiness. *Corporate Social Responsibility and Environmental Management*, csr.1785. <https://doi.org/10.1002/csr.1785>

Li, S., Jiang, Y., Zhou, Y., Li, R., Jiang, Y., Alomgir Hossen, M., Dai, J., Qin, W., & Liu, Y. (2022). Facile fabrication of sandwich-like anthocyanin/chitosan/lemongrass essential oil films via 3D printing for intelligent evaluation of pork freshness. *Food Chemistry*, 370, 131082. <https://doi.org/10.1016/j.foodchem.2021.131082>

Lille, M., Kortekangas, A., Heiniö, R.-L., & Sozer, N. (2020). Structural and Textural Characteristics of 3D-Printed Protein- and Dietary Fibre-Rich Snacks Made of Milk Powder and Wholegrain Rye Flour. *Foods*, 9(11), 1527. <https://doi.org/10.3390/foods9111527>

Lille, M., Nurmela, A., Nordlund, E., Metsä-Kortelainen, S., & Sozer, N. (2018). Applicability of protein and fiber-rich food materials in extrusion-based 3D printing. *Journal of Food Engineering*, 220, 20–27. <https://doi.org/10.1016/j.jfoodeng.2017.04.034>

Lin, Y.-J., Punpongsanon, P., Wen, X., Iwai, D., Sato, K., Obrist, M., & Mueller, S. (2020). FoodFab: Creating Food Perception Illusions using Food 3D Printing. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. <https://doi.org/10.1145/3313831.3376421>

Lipton, J. I. (2017). Printable food: the technology and its application in human health. *Current Opinion in Biotechnology*, 44, 198–201. <https://doi.org/10.1016/j.copbio.2016.11.015>

Lipton, J. I., Cutler, M., Nigl, F., Cohen, D., & Lipson, H. (2015). Additive manufacturing for the food industry. *Trends in Food Science & Technology*, 43(1), 114–123. <https://doi.org/10.1016/j.tifs.2015.02.004>

Liu, Z., Bhandari, B., Guo, C., Zheng, W., Cao, S., Lu, H., Mo, H., & Li, H. (2021). 3D Printing of Shiitake Mushroom Incorporated with Gums as Dysphagia Diet. *Foods*, 10(9), 2189. <https://doi.org/10.3390/foods10092189>

Liu, Z., & Zhang, M. (2019). 3D Food Printing Technologies and Factors Affecting Printing Precision. In *Fundamentals of 3D Food Printing and Applications* (pp. 19–40). Elsevier. <https://doi.org/10.1016/B978-0-12-814564-7.00002-X>

Liu, Z., Zhang, M., Bhandari, B., & Wang, Y. (2017). 3D printing: Printing precision and application in food sector. *Trends in Food Science & Technology*, 69, 83–94. <https://doi.org/10.1016/j.tifs.2017.08.018>

Livingstone, K. M., Celis-Morales, C., Navas-Carretero, S., San-Cristobal, R., Forster, H., Woolhead, C., O'Donovan, C. B., Moschonis, G., Manios, Y., Traczyk, I., Gundersen, T. E., Drevon, C. A., Marsaux, C. F. M., Fallaize, R., Macready, A. L., Daniel, H., Saris, W. H. M., Lovegrove, J. A., Gibney, M., ... Mathers, J. C. (2021). Personalised nutrition advice reduces intake of discretionary foods and beverages: findings from the Food4Me randomised controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, 18(1). <https://doi.org/10.1186/s12966-021-01136-5>

Lorenz, T., Iskandar, M. M., Baeghbali, V., Ngadi, M. O., & Kubow, S. (2022). 3D Food Printing Applications Related to Dysphagia: A Narrative Review. *Foods*, 11(12), 1789.

<https://doi.org/10.3390/foods11121789>

Ma, Y., Potappel, J., Chauhan, A., Schutyser, M. A. I., Boom, R. M., & Zhang, L. (2023). Improving 3D food printing performance using computer vision and feedforward nozzle motion control. *Journal of Food Engineering*, 339, 111277.

<https://doi.org/10.1016/j.jfoodeng.2022.111277>

Ma, Y., & Zhang, L. (2022). Formulated food inks for extrusion-based 3D printing of personalized foods: a mini review. *Current Opinion in Food Science*, 44, 100803.

<https://doi.org/10.1016/J.COFS.2021.12.012>

Mantihal, S., Prakash, S., Godoi, F. C., & Bhandari, B. (2017). Optimization of chocolate 3D printing by correlating thermal and flow properties with 3D structure modeling. *Innovative Food Science & Emerging Technologies*, 44, 21–29. <https://doi.org/10.1016/j.ifset.2017.09.012>

Mikahila, L. (2022). [How 3D-Printed Sustainable Packaging Meets Corporate Goals & Consumer Demands](#). *3D Natives*

Molitch-Hou, M. (2021). [BASF's Forward AM Certifies 3D Printing for Food Contact](#).

Motoki, K., Park, J., Spence, C., & Velasco, C. (2022). Contextual acceptance of novel and unfamiliar foods: Insects, cultured meat, plant-based meat alternatives, and 3D printed foods. *Food Quality and Preference*, 96, 104368. <https://doi.org/10.1016/j.foodqual.2021.104368>

Nachal, N., Moses, J. A., Karthik, P., & Anandharamakrishnan, C. (2019). Applications of 3D Printing in Food Processing. *Food Engineering Reviews*, 11(3), 123–141.

<https://doi.org/10.1007/s12393-019-09199-8>

Navaf, M., Sunooj, K. V., Aaliya, B., Akhila, P. P., Sudheesh, C., Mir, S. A., & George, J. (2022). 4D printing: a new approach for food printing; effect of various stimuli on 4D printed food properties. A comprehensive review. *Applied Food Research*, 2(2), 100150.

<https://doi.org/10.1016/J.AFRES.2022.100150>

New Food. (2022). 3-D printed cultured seafood agreement signed. *New Food Magazine*.

Nida, S., Moses, J. A., & Anandharamakrishnan, C. (2021). 3D printed food package casings from sugarcane bagasse: a waste valorization study. *Biomass Conversion and Biorefinery*.

<https://doi.org/10.1007/s13399-021-01982-0>

Nopparat, N., & Motte, D. (2022). The influence of business model on the development of 3D food printing technology for dysphagia patients in elderly care. *Materials Today: Proceedings*.

<https://doi.org/10.1016/j.matpr.2022.09.028>

Pant, A., Lee, A. Y., Karyappa, R., Lee, C. P., An, J., Hashimoto, M., Tan, U.-X., Wong, G., Chua, C. K., & Zhang, Y. (2021). 3D food printing of fresh vegetables using food hydrocolloids for dysphagic patients. *Food Hydrocolloids*, 114, 106546.

<https://doi.org/10.1016/j.foodhyd.2020.106546>

Patra, S., & Young, V. (2016). A Review of 3D Printing Techniques and the Future in Biofabrication of Bioprinted Tissue. *Cell Biochemistry and Biophysics*, 74(2), 93–98.

<https://doi.org/10.1007/s12013-016-0730-0>

Pérez, B., Nykvist, H., Brøgger, A. F., Larsen, M. B., & Falkeborg, M. F. (2019). Impact of macronutrients printability and 3D-printer parameters on 3D-food printing: A review. *Food Chemistry*, 287, 249–257. <https://doi.org/10.1016/j.foodchem.2019.02.090>

Portanguen, S., Tournayre, P., Sicard, J., Astruc, T., & Mirade, P.-S. (2022). 3D food printing: Genesis, trends and prospects. In *Future Foods* (pp. 627–644). Elsevier.

<https://doi.org/10.1016/B978-0-323-91001-9.00008-6>

Pulatsu, E., Su, J. W., Lin, J., & Lin, M. (2022). Utilization of Ethyl Cellulose in the Osmotically-Driven and Anisotropically-Actuated 4D Printing Concept of Edible Food Composites. *Carbohydrate Polymer Technologies and Applications*, 3, 100183.

<https://doi.org/10.1016/J.CARPTA.2022.100183>

Rogers, H., & Srivastava, M. (2021). Emerging Sustainable Supply Chain Models for 3D Food Printing. *Sustainability*, 13(21), 12085. <https://doi.org/10.3390/su132112085>

Rogers, H., & Streich, A. (2019, July). [3D food printing in Europe: Business model and supply chain aspects.](#)

Ross, M. M., Collins, A. M., McCarthy, M. B., & Kelly, A. L. (2022). Overcoming barriers to consumer acceptance of 3D-printed foods in the food service sector. *Food Quality and Preference*, 100, 104615. <https://doi.org/10.1016/j.foodqual.2022.104615>

Shahrubudin, N., Lee, T. C., & Ramlan, R. (2019). An Overview on 3D Printing Technology: Technological, Materials, and Applications. *Procedia Manufacturing*, 35, 1286–1296.

<https://doi.org/10.1016/j.promfg.2019.06.089>

Short, S., Strauss, B., & Lotfian, P. (2021). Emerging technologies that will impact on the UK Food System. <https://doi.org/10.46756/sci.fsa.srf852>

Sun, J., Zhou, W., Huang, D., Fuh, J. Y. H., & Hong, G. S. (2015). An Overview of 3D Printing Technologies for Food Fabrication. *Food and Bioprocess Technology*, 8(8), 1605–1615.

<https://doi.org/10.1007/s11947-015-1528-6>

Tan, C., Toh, W. Y., Wong, G., & Lin, L. (2018). Extrusion-based 3D food printing – Materials and machines. *International Journal of Bioprinting*, 4(2). <https://doi.org/10.18063/ijb.v4i2.143>

Tay, Y. W. D., Panda, B., Paul, S. C., Noor Mohamed, N. A., Tan, M. J., & Leong, K. F. (2017). 3D printing trends in building and construction industry: a review. *Virtual and Physical Prototyping*, 12(3), 261–276. <https://doi.org/10.1080/17452759.2017.1326724>

The Commission of the European Communities. (2009). COMMISSION REGULATION (EC) No 450/2009 of 29 May 2009 on active and intelligent materials and articles intended to come into contact with food. *Official Journal of the European Union*.

The European Parliament and the Council of the European Union. (2015). REGULATION (EU) 2015/2283 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL. *Official Journal of the European Union* L327/1.

Tomašević, I., Putnik, P., Valjak, F., Pavlić, B., Šojić, B., Bebek Markovinović, A., & Bursa Kovačević, D. (2021). 3D printing as novel tool for fruit-based functional food production. *Current Opinion in Food Science*, 41, 138–145. <https://doi.org/10.1016/j.cofs.2021.03.015>

Tracey, C. T., Predeina, A. L., Krivoschapkina, E. F., & Kumacheva, E. (2022). A 3D printing approach to intelligent food packaging. *Trends in Food Science & Technology*, 127, 87–98. <https://doi.org/10.1016/J.TIFS.2022.05.003>

Tran, J. L. (2016). 3D-Printed Food. *Minnesota Journal of Law, Science & Technology*, 17(2).

Vegconomist. (2022a). [3D-Printed Revo Salmon Now Available for Home Delivery in Austria.](#)

Vegconomist. (2022b). [Revo Foods: “In Five Years, Revo Will Be the Leading Provider of Plant-Based Seafood in the World.”](#)

Verma, V. K., Kamble, S. S., Ganapathy, L., Belhadi, A., & Gupta, S. (2022). 3D Printing for sustainable food supply chains: modelling the implementation barriers. *International Journal of Logistics Research and Applications*, 1–27. <https://doi.org/10.1080/13675567.2022.2037125>

Waghmare, R., Suryawanshi, D., & Karadbhajne, S. (2022). Designing 3D printable food based on fruit and vegetable products—opportunities and challenges. *Journal of Food Science and Technology*. <https://doi.org/10.1007/s13197-022-05386-4>

Wainwright, O. (2013). [3D-print your face in chocolate for that special Valentine's Day gift. The Guardian.](#)

Wang, W., Yao, L., Zhang, T., Cheng, C.-Y., Levine, D., & Ishii, H. (2017). Transformative Appetite: Shape-Changing Food Transforms from 2D to 3D by Water Interaction through Cooking. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 6123–6132. <https://doi.org/10.1145/3025453.3026019>

Wegrzyn, T. F., Golding, M., & Archer, R. H. (2012). Food Layered Manufacture: A new process for constructing solid foods. *Trends in Food Science & Technology*, 27(2), 66–72. <https://doi.org/10.1016/j.tifs.2012.04.006>

Wilms, P., Daffner, K., Kern, C., Gras, S. L., Schutyser, M. A. I., & Kohlus, R. (2021). Formulation engineering of food systems for 3D-printing applications – A review. *Food Research International*, 148, 110585. <https://doi.org/10.1016/j.foodres.2021.110585>

Yan, Q., Dong, H., Su, J., Han, J., Song, B., Wei, Q., & Shi, Y. (2018). A Review of 3D Printing Technology for Medical Applications. *Engineering*, 4(5), 729–742. <https://doi.org/10.1016/j.eng.2018.07.021>

Yang, Q., Gao, B., & Xu, F. (2020). Recent Advances in 4D Bioprinting. *Biotechnology Journal*, 15(1), 1900086. <https://doi.org/10.1002/biot.201900086>

Zhai, X., Sun, Y., Cen, S., Wang, X., Zhang, J., Yang, Z., Li, Y., Wang, X., Zhou, C., Arslan, M., Li, Z., Shi, J., Huang, X., Zou, X., Gong, Y., Holmes, M., & Povey, M. (2022). Anthocyanins-encapsulated 3D-printable bigels: A colorimetric and leaching-resistant volatile amines sensor for intelligent food packaging. *Food Hydrocolloids*, 133, 107989. <https://doi.org/10.1016/j.foodhyd.2022.107989>

Zhang, Longzhen, Dong, H., Yu, Y., Liu, L., & Zang, P. (2022). Application and challenges of 3D food printing technology in manned spaceflight: a review. *International Journal of Food Science & Technology*, 57(8), 4906–4917. <https://doi.org/10.1111/ijfs.15879>

Zhang, Lu, Lou, Y., & Schutyser, M. A. I. (2018). 3D printing of cereal-based food structures containing probiotics. *Food Structure*, 18, 14–22. <https://doi.org/10.1016/j.foostr.2018.10.002>

Zhang, Z., Demir, K. G., & Gu, G. X. (2019). Developments in 4D-printing: a review on current smart materials, technologies, and applications. *International Journal of Smart and Nano Materials*, 10(3), 205–224. <https://doi.org/10.1080/19475411.2019.1591541>

Zhu, S., Ribberink, M., de Wit, M., Schutyser, M., & Stieger, M. (2020). Modifying sensory perception of chocolate coated rice waffles through bite-to-bite contrast: an application case study using 3D inkjet printing. *Food & Function*, 11(12), 10580–10587. <https://doi.org/10.1039/D0FO01787F>

Zhu, S., Vazquez Ramos, P., Heckert, O. R., Stieger, M., van der Goot, A. J., & Schutyser, M. (2022). Creating protein-rich snack foods using binder jet 3D printing. *Journal of Food Engineering*, 332, 111124. <https://doi.org/10.1016/j.jfoodeng.2022.111124>

Zoran, A., & Coelho, M. (2011). Cornucopia: The Concept of Digital Gastronomy. *Leonardo*, 44(5), 425–431. https://doi.org/10.1162/LEON_a_00243