

Food Physics as One of the Dominant Parts of the Interdisciplinary Science of the XXI Century

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Abstract: The forming and establishment of rather new fields in the science is a normal process, carried out dominantly by 2 ways: differentiation and integration. This fact of development is typical for food physics, as well. The paper deals with the following topics: (1) food physics as an interdisciplinary science; (2) help for nutrition science from side of food physics; (3) development trends of food physics (Quo Vadis Cibus Physicorum?); (4) is it true, that without high level of knowledge in physics the food engineers cannot fulfill the expectations of modern food processing technologies?

Key words: Applied physics, education, food science, measurement technique, nutrition.

1. Introduction

In our earlier paper [1] we tried to give a clear picture about the importance of food physics—to fulfill the expectations of modern food technologies—which is a bridge between applied physics and food science.

This paper deals with some questions of fields, tasks, connections and development trends of food physics. Let us mention that this material is based partly on the presentation of the opening lecture [2] of the ICFP (Int. Conf. of Food Physicists) meeting, 2018, Antalya, Turkey, 23-25 Oct., 2018. The ISFP (International Society of Food Physicists) organises in every second year a conference (the first one was held in Budapest, Hungary, 1994) and we had an excellent conference in Turkey in 2018, as the XIIIth one. The next one will be in Iasi, Romania, 2020.

2. Food Physics, as an Interdisciplinary Science

As you know the science of food physics is the “result” of differentiation within applied physics (like

biophysics, agrophysics) and within food science (like food chemistry, food microbiology), and the “result” of integration (collaboration) of applied physics and food science. Fig. 1 shows the process of differentiation and integration.

Of course there is no sharp dividing line between e.g. food chemistry and food physics, or between biophysics and food physics. Anyway, food physics is a rather new (and rapidly developing) field of science which is a typical interdisciplinary subsience [3, 4].

3. Help for Nutrition Science

Food physics has many connections to other parts of different fields of science, e.g. food analysis, food processing. One is the nutrition science.

Food physics—as compared to fundamental sciences—is a typical applied science, covering the problems of practical life, including the questions and problems of nutrition, as well, e.g. composition determination of the nourishment with physical methods. So help for nutrition science in:

- food quality control, quality assurance;
- determination of macro components (e.g. NIR/NIT, NMR, PAS);
- determination of micro components (e.g. INAA, XRF);

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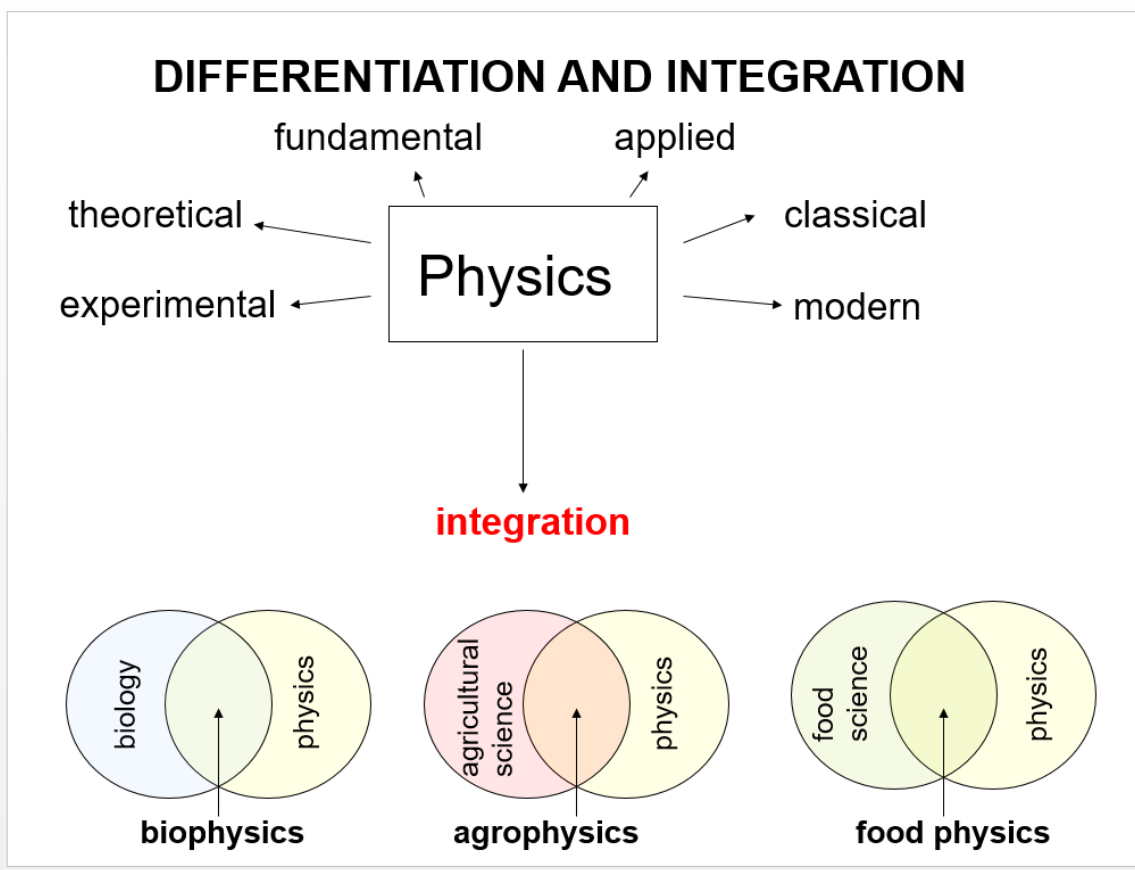


Fig. 1 Differentiation and integration in physics.

- to produce safe, sterile food (no microbial contamination) e.g. with irradiation or heat treatment or high pressure technology;
- to improve the sensory properties of foodstuffs with physical treatments;
- improvement of food processing technology, minimal processing, combination of different technologies, microwave, nanofiltration etc.;
- development of robot technologies for food production.

4. Development of Food Physics (Quo Vadis Cibus Physicorum?)

Because food physics covers dominantly the topics of investigation of physical properties of foodstuffs and measurement and treatment of foodstuffs with physical methods and techniques, it is clear that there are basically 2 directions of R+D activity:

- development of measurement techniques (dominantly nondestructive and noninvasive techniques), like NIR/NIT, NMR, PAS, DSC methods;
- development of methods of processing technologies.

Fig. 2 shows the technology hill.

5. Is It Necessary to Have Rather High Level of Knowledge for Food Engineers?

Is it true, that without high level of knowledge in physics the food engineers and food technologists cannot fulfill efficiently the expectations of modern food processing technologies and unit operations? Yes, it is [5].

In other words, without this knowledge they cannot take part successfully in innovation, R+D activity, creation of new technological lines, even in the everyday

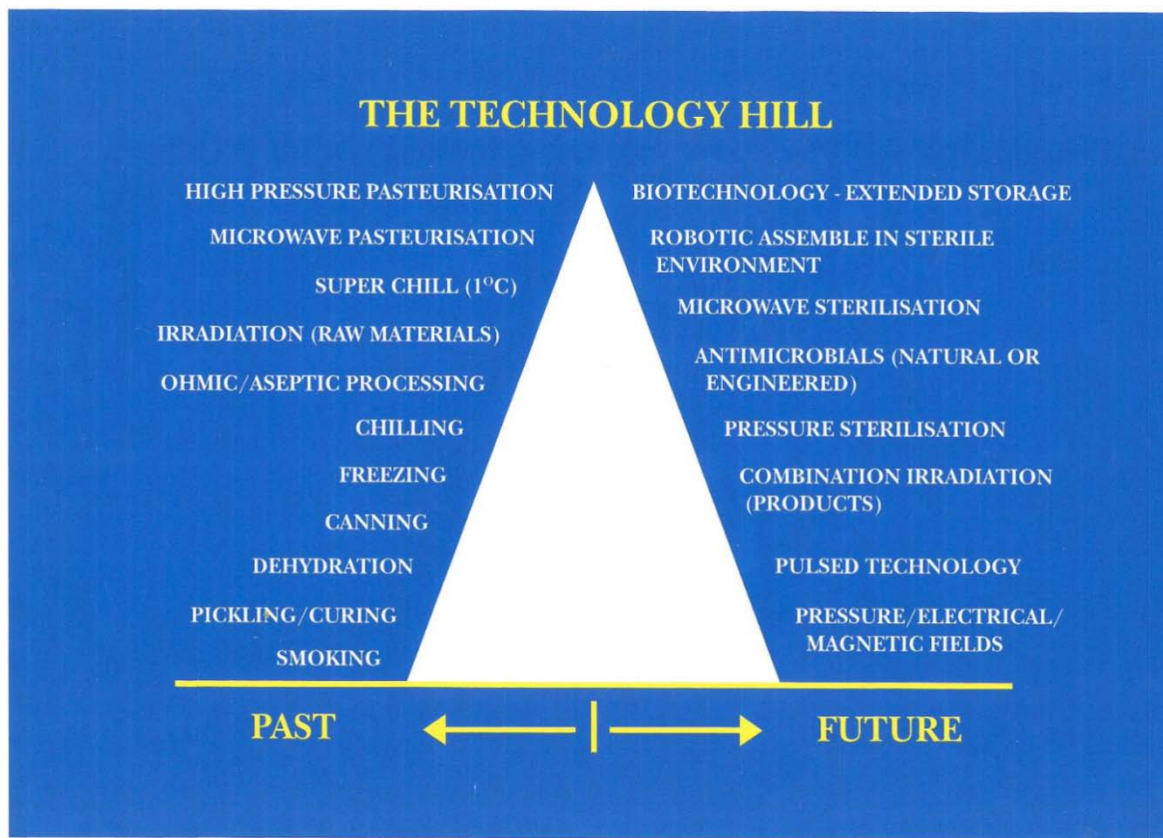


Fig. 2 The technology hill.

processing of food products using up-to-date technologies.

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