

Editorial

# Emerging Trends in Beverage Processing

Antonio Morata 

enotecUPM, Chemistry and Food Technology Department, Escuela Técnica Superior de Ingeniería Agronómica, Alimentaria y de Biosistemas, Universidad Politécnica de Madrid, Avenida Puerta de Hierro 2, 28040 Madrid, Spain; antonio.morata@upm.es

Beverage processing is open to new technologies; among them, nonthermal physical technologies such as discontinuous hydrostatic pressure (HHP), ultrahigh-pressure homogenization (UHPH), pulsed electric field (PEF), ultrasound (US), atmospheric pressure cold plasma (APCP), or pulsed light (PL) are growing increasingly in the food industry. The potentiality to speed up the production process, to improve the quality, to develop new beverages or new features in conventional beverages, to reach more stable beverages with better safety, and to protect sensory and nutritional quality are key parameters allowed by these technologies. Additionally, emerging fermentation biotechnologies or new perspectives on sensory attributes also contribute to the development of new beverages with increased acceptance by consumers.

The use of emerging technologies in the processing of fruits and juices for beverage production was strongly developed in the last 20 years. Technologies such as HHP, UHPH, PEF, US, APCP, or PL are used to process fruits or juices, increasing extraction yields, inactivating microorganism, improving colloidal stability, enhancing long term microbial and physicochemical stability [1], and additionally allowing the use of new fermentation biotechnologies [2] with positive sensory impacts [2,3]. Discontinuous hydrostatic pressure (HHP) facilitates better extraction and microbial control, preserving juice quality [4], and can be used as a storage technology to keep stable beverage properties at room temperature [5]. New materials will allow for the optimization of the problems concerning vessels for high-pressure storage. Continuous (ultra)high-pressure homogenization ((U)HPH) is an efficient and highly reliable technology for microbial control and even sterilization depending on in-valve temperatures with gentle management of the nutritional and sensory features [6,7], allowing for even effective destruction of oxidative enzymes (PPO) and therefore minimizing the use of chemical additives like sulfites [8]. The use of pulsed electric fields (PEF) and ultrasounds (US) facilitates the extraction of pigments and tannins, facilitating winemaking technologies [9], controlling microorganisms, and improving fermentation biotechnologies such as the use of non-*Saccharomyces* yeasts [10]. PEF extraction and microbial control are due to cell electroporation, and ultrasound extraction is enabled by cavitation phenomena [9]. Atmospheric pressure cold plasma (APCP) is a nonthermal technology that promotes higher color intensity and more tannins, improving wine quality [11]. Plasma is a gas state that contains ionized particles that can be applied in beverages directly or indirectly to process liquids and to control microorganisms. Pulsed light (PL) is the use of high-intensity UV-visible-IR radiation during an ultrashort flash to eliminate microorganisms in fruits and in juices or beverages [12,13]. PL can be considered a nonthermal technology producing temperature increments no higher than 3 °C [12]. Some effects on extraction and enzyme control have been described [12]. The effectivity is similar to or higher than UV continuous radiation but in a faster and more effective process. Microbial control by emerging nonthermal technologies facilitate the implantation of new fermentation biotechnologies as the use of non-*Saccharomyces* yeasts [2] or yeast–bacteria co-inoculations with *Lactobacillus plantarum* [14]. *L. plantarum* opens new possibilities in the control of malolactic fermentation in wines. Finally, sensory assessment is a hot topic in the evaluation of quality in beverages, though some confusing attributes are frequently



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used to describe high-quality beverages as wines. Minerality is a complex concept that is used to describe premium wines that are connected to production areas and reflect stony and mineral perceptions. It has been observed that, in fact, such sensory perceptions may not be correlated with mineral compounds and must be understood as sensory impacts produced by organic volatile compounds [15].

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