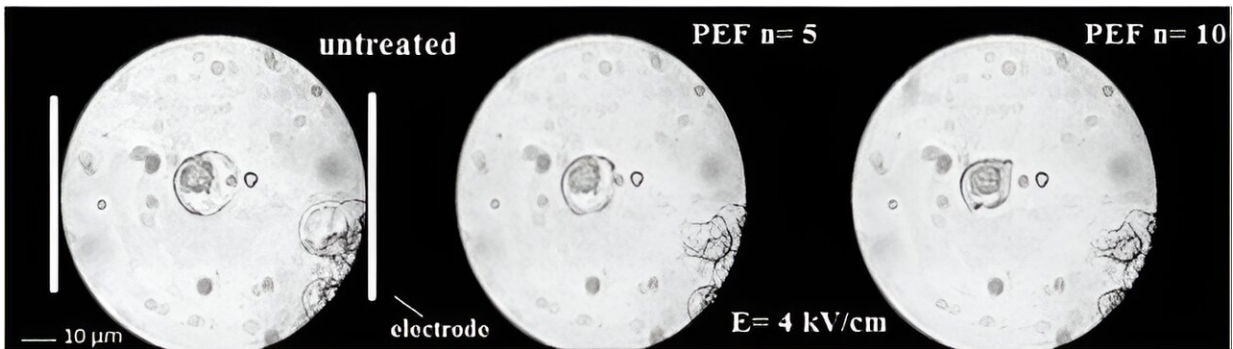


Physical field technologies to improve extraction and quality of extracted juices

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Protoplast serves as a model system for visualizing the impact of PEF-induced (4kV/cm) membrane rupture and cell shrinking. Credit: Afraz, M. T., et al.

Consumers are increasingly health-conscious and seek products with minimal additives and preservatives. The modern consumer understands the link between consuming bioactive compounds from fruits and vegetables and the associated health benefits. Hence, there has been a steady rise in demand for juices made from fresh fruits and vegetables, with minimal processing and no added sugars.

Research indicates that consuming such juices is associated with numerous health benefits, including a reduced risk of chronic diseases, improved immune function and enhanced digestion. Furthermore, juices rich in antioxidants, such as those made from berries and dark-colored

fruits, have been linked to reduced inflammation and improved cardiovascular health.

In a new review published in the journal *Food Physics*, the authors explored the science behind physical field technologies for improved extraction of juices with enhanced quality attributes.

"Pulsed electric field (PEF) stands out as a superior choice for juice extraction due to its [high efficiency](#) in improving juice yield, better preservation of sensory properties and nutrients, lower energy consumption, and excellent scalability and adaptability," explains corresponding author Zhong Han, a professor in the School of Food Science and Engineering at South China University of Technology (SCUT).

"PEF is a nonthermal process, which means that it does not involve the application of heat."

In particular, PEF is beneficial for preserving heat-sensitive nutrients, such as vitamins and antioxidants, and for maintaining the natural taste and aroma profiles of fruits and vegetable juices. During PEF treatment, an external [electric field](#) causes ions to move inside and outside the cells until they build up at the membrane.

Oppositely charged ions on either side of the membrane experience attraction which compresses the membrane, making it thinner. When the electrical field gets strong enough, it creates pores, allowing beneficial compounds to escape into the [juice](#).

According to first author Muhammad Talha Afraz, a doctoral student at SCUT, PEF technology not only improves the quantitative parameters but also the qualitative parameters.

"PEF application suppresses the spoilage microorganisms and enzymatic actions in post-extracted juices thus extending the [shelf life](#) without compromising their quality," explains Afraz.

The authors hope that future research efforts prioritize exploring the synergistic effects achieved through combining physical field technologies with other methods.

More information: Muhammad Talha Afraz et al, The science behind physical field technologies for improved extraction of juices with enhanced quality attributes, *Food Physics* (2024). [DOI: 10.1016/j.foodp.2024.100008](#)

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