Abstract

Development of Electrolysis for Oi Sobaegi Fermentation and Analysis of Volatile Compound Changes with Gas Chromatography–Mass Spectrometer †

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This research introduces a method for modifying and enhancing the fermentation process and aroma of cucumber kimchi (Oi Sobaegi) based on an electrolysis mechanism using spring coil electrodes. The electrodes are immersed into kimchi, allowing electrochemical reactions of volatile compounds, leading to odor compound changes in composition, smell, and concentration of the cucumber kimchi. Additionally, the potential of the approach to expedite the fermentation time was explored.

The cucumber kimchi samples, treated with electrolysis at 30 and 60 min, were compared with untreated control samples collected at specified fermentation times. The samples were further analyzed using headspace solid-phase microextraction (HS-SPME) and coupled with gas chromatography–mass spectrometry (GC-MS) for volatile compound identification.

Results indicated that after 30 min of electrolysis treatment, there was an enhancement in the amounts of Citronellol (fresh, floral, clean, and rose), Trisulfide, di-2-propenyl (sulfurous, garlic, and onion), (E)-β-Farnesene (woody, citrus, herbal, and sweet), Terpinen-4-ol (mild, earthy, and woody odor), α-Terpineol (pine, terpene, lilac, woody, resinous, cooling, lemon, citrus, and floral).

A new compound, 3H- 1,2-Dithiole with the odor of garlic asparagus, was also observed.

The established approach demonstrates the capability to adjust the fermentation enrichment and aroma of cucumber kimchi, potentially serving as a tool for customizable food quality in the future.

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