

# Commercialization of Electrical Impedance Spectroscopy for Food Quality: A review

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Food quality analysis is crucial for ensuring consumer safety and satisfaction. As a Ph.D. physiologist with an academic job, I recognized the potential of Electrical Impedance Spectroscopy (EIS) and started a company called CQFoods (now Bialume) with the intention of commercializing impedance for commercial use in the food space. I will discuss how our research and development is with researchers at both Universities and various industry companies within the beef, scallop, poultry, and seafood, and how these collaborative projects have yielded commercialized devices. The problem that this process is solving is that current industry methods are costly, subjective, expensive, and usually destructive. EIS emerges as a promising technique for assessing various quality parameters of food. This review will explore the principles, methodologies, and applications of how we used EIS in food quality analysis, measuring impedance across a range of frequencies. These findings were correlated to useful industry problems such as composition, structure, and tissue properties. Sample preparation, measurement setup, and data analysis will be outlined, emphasizing the approach from a physiologist and not an electrical engineer. EIS holds significant potential for enhancing food quality assessment, contributing to improved food safety and consumer confidence. Industry is very interested in impedance because of its advantages such as non-destructive testing and rapid measurement. Results will be shown from various industry projects with discussions on how companies or researchers are creating value from that data. Examples include reducing the prevalence of a muscle problem for a poultry company from 25% to 3%, measuring inbound seafood, freezing of scallops, collagen in chicken, and quality. The future of our company will be discussed in terms of making this process easier and more efficient.