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From Chemometric Sensing to Decisions: AI/ML-Driven Analytics for Real-Time Food Quality Control

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FT-NIR and FTIR spectroscopy and other Chemometric Sensing methods are becoming well-established tools for rapid, non-destructive quality assessment and control across the food industry, offering a faster, cheaper alternative to traditional wet-chemical analysis for monitoring composition, authenticity, and safety. This talk uses chemometric sensing as a working example, though the same principles extend to other sensor and process data streams, to examine how artificial intelligence and machine learning move beyond raw measurement toward interpretation and decision making, turning spectra and signals into actionable calls on quality, safety, and process control. Alongside these opportunities, the talk will address practical barriers to industrial adoption: sensor calibration, instrument drift, the challenge of transferring models across devices, and issues with training data. Finally, I will provide, from an academic perspective, suggestions for food companies considering AI/ML-enabled sensing: what to prioritize, what pitfalls to avoid, and how to build a foundation for reliable, scalable, decision-ready deployment. The goal is a grounded, academic/industry-relevant view of how chemometric sensing and AI/ML together are reshaping food quality decision making, and what it will take to get there.