Title Electrocatalytic analyzer for ethylene monitoring and control of kiwifruit and apple cold stores

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Abstract

Maintaining the quality and freshness of fruit and vegetables during transportation and storage is an important role for most postharvest industries. Kiwifruit production, for example, is an important part of the agricultural economy in Southwest France, with production exceeding 80000 MT per year. One way to control the freshness and quality of kiwifruit stored under controlled atmosphere conditions is by judicious monitoring and regulation of ethylene in the storage rooms. Continuous exposure to 30 ppb provides 5 months of shelf life, levels of only 0.5 ppm limit the shelf life to less than 1 month, and ethylene exposure at 10 ppm destroys the fruit in less than I week. ABSOGER has been providing scrubbing solutions to the kiwifruit industry for the past 20 years. Monitoring the ethylene levels has been historically performed by taking samples from the cold stores for laboratory analysis using gas chromatography. In this presentation, we introduce a new ethylene analyzer that provide cost-effective, accurate, and automatic sampling of kiwifruit stores for real-time monitoring and control. In this analyzer, oxidation of ethylene on a gold electrocatalyst produces a highly detectable and measurable amperormetric signal. The analyzer has been packaged into a complete field portable unit, together with oxygen and CO_2 sensors. It continuously samples the air at 250 ml/min and reports the ethylene concentration in air at a user-specified time interval. The direct contact between the ethylene molecules in air and electrocatalytic surface renders this process more sensitive and responsive than conventional diffusion-type electrochemical cells, while the simplicity of this system renders it much more affordable than a gas chromatography system. This system has been shown to be quite effective for continuous monitoring of cold storage rooms, where detection of lower than 10-ppm down to 10-ppb is desirable. The details of the system and its method of operation will be covered in the oral presentation.