Rapid assessment of quality changes in French fries during deep-frying based on FTIR spectroscopy combined with artificial neural network

lirong xu¹, gangcheng wu², Xin Ji², and Xingguo Wang²

¹Jiangnan University

²Affiliation not available

October 26, 2020

Abstract

Fourier transform infrared (FTIR) spectroscopy combined with back propagation artificial neural network (BP-ANN) were utilized for rapid and simultaneous assessment of the lipid oxidation indices in French fries. The conventional indexes (i.e. total polar compounds, oxidized triacylglycerol polymerized products, oxidation products, and triacylglycerol hydrolysis products, acid values and peroxide values), and FTIR absorbance intensity in French fries were determined during deep-frying process, and the results showed the French fries had better quality in palm oil, followed by sunflower oil, rapeseed oil and soybean oil. The FTIR spectra of oil extracted from French fries were correlated to the reference oxidation indexes determined by AOCS standard method. The results of BP-ANN prediction showed that the model based on FTIR fitted well ($R^2 > 0.926$, RMSEC < 0.614 , RMSEP < 0.550) compared with partial least-squares model ($R^2 > 0.876$, RMSEC < 1.144 , RMSEP < 1.257). This facile strategy with excellent performance has great potential for rapid characterization quality of French fries during frying.

Hosted file

mauscript-revised.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>

Hosted file

Figure captions.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>

Hosted file

Figure1.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>

Hosted file

Figure2.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>

Hosted file

Figure3.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>

Hosted file

Figure4.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>

Hosted file

Table1-3.pdf available at <https://authorea.com/users/370286/articles/488970-rapid-assessment-of-quality-changes-in-french-fries-during-deep-frying-based-on-ftir-spectroscopy-combined-with-artificial-neural-network>