Visual Mapping of Macromolecular Constituents of Fried Dough Using Near-Infrared Hyperspectral Imaging Technology

Oluwatoyin O. Onipe[1], Afam I.O. Jideani[1,2]

[1]Department of Food Science & Technology, University of Venda, Thohoyandou, South Africa.
[2]Postharvest-Handling
Group, ISEKI-Food Association, Vienna, Austria

Abstract

Deep frying is a complex process that involves a physical and chemical transformation of the food and the formation of new compounds which have not been quantified or reported in fried dough products. The distribution of chemical components of fried dough (*magwinya*) was visualised using NIR hyperspectral imaging. Fried dough enriched with 1 – 20% wheat bran was captured with a short wave infra-red camera and raw images were mean-centred. Principal component analysis (PCA) was applied to mean-centred data for pixel-wise classification using spectral scattering (standard normal variate) and 1st and 2nd derivatives of the Savitzky-Golay method. There was minimal separation observed in the PCA due to a large similarity between classes. Prominent bands related to oil were featured at 1400, 2305 and 1716 nm, while those related to starch were featured at 1449, 1776, and 2261 nm. 1941 (related to moisture), and 2117 nm (related to protein). Bands related to protein were featured at 1509, 1994, 2223, 2229 nm and water at 1450, 1934 and 1940nm. Aromatics, phenols (1422 nm) and benzene were also identified, albeit minimum. The processing methods and some principal components assisted in mapping the chemical components of *magwinya*. Visualisation of *magwinya* chemical constituents using HSI shows good promise for further research in modelling and predictions.

Keywords: NIR, spectra images, wavelength, hyperspectral imaging, *magwinya*.

Biography: Oluwatoyin O. Onipe

Dr Onipe is a postdoctoral research fellow at the department of Food Science & Technology, University of Venda. Her research interests include valorisation of food by-products and under-utilised crops as functional food ingredients, dietary fibre modifications.