

Functional characterization of milk powders using Hyperspectral Imaging technique

DADI A. (1), MALLIKARJUNAN K. (1)

1 UNIVERSITY OF MINNESOTA, SAINT PAUL, United States

Hyperspectral Imaging (HSI) is an emerging technique that incorporates imaging and spectroscopy for acquisition of both spatial and spectral information from an object. Food products characterization using HSI is becoming an alternative to traditional analytical methods. Powdered milk products are valuable food ingredients delivering different functional properties with nutritional advantages. These products undergo quality changes upon exposure of intrinsic and extrinsic factors. In the past decades, the analytical and quality evaluation techniques were so conventional that immediate decisions have not been made to ensure the desired quality on timely basis. Hyperspectral imaging (HSI) can be applied for rapid evaluation of quality characteristics and classification of dairy products in non-invasive manner. Functional properties for characterization of milk powder products including foaming, emulsion, dispersibility, and solubility were measured using conventional techniques following standard analytical procedures. Milk powder functional properties as indicator for product quality and linking milk powder process variables with product quality were correlated with HSI spectral data. Milk powder samples including whey protein isolates and concentrates, milk protein isolates and concentrates, and non-fat dry milk treated at different levels of storage days, humidity, and temperature and were analyzed using a line scan camera in the wavelength range of 367-1048 nm, and pixels' reflection value converted to 0 to 1 scale. Depending on the characteristic parameters, appropriate models were developed to understand the relationships. Based on the chosen experimental plan, HSI is anticipated to provide corresponding characteristic results in response to given treatment conditions. Thus, it will be indicated that HSI will have potential in substituting the labor intensive, time, and chemical consuming analytical methods by advanced techniques for predicting several quality parameters and classifying them in accurate and rapid real time basis.