



Sense The Real Change



20th INTERNATIONAL CONFERENCE ON NEAR INFRARED SPECTROSCOPY



WELCOME TO NIR2021

On behalf of the organizing committee, we would like to invite you to join us at the 20th biennial meeting of the International Council for NIR Spectroscopy (ICNIRS), to be held from October 17th to 21st 2021 in Beijing, China. NIR2021 will provide an international forum for scientists, engineers, and postgraduate students to exchange and discuss new ideas, new findings, and new technologies for NIR spectroscopy and related areas.

The slogan of NIR2021 in Beijing is “Sense the Real Change”, meaning that we will sense the various spectral information of NIR, the development of spectral theory and chemometrics, the enhanced performance of instruments and measurement accessories. We also hope that every participant can personally sense the real changes in China, including the historical charm and modern atmosphere. And you can feel the passion of Chinese near-infrared researchers for NIR spectroscopy.

The theme of the conference is indicated by the logo, which is “Rainbow: Diversity, Optimization, and Inspiration”. The rainbow in the logo represents the spectrum, as well as the famous Chinese dragon. The dancing dragon signifies that NIR is taking off in the international technological arena, playing an increasingly important role in agriculture, food, pharmaceutical and chemical industries, and people's daily lives.

We hope that the NIR 2021 will make a great contribution to accelerate the advance of NIR technology through constructing a strong human network for NIR Spectroscopy in the world, and that you all will enjoy your stay in the wonderful city of Beijing, China.

We hope you can join us for this exciting event, and we look forward to seeing you all in Beijing in 2021.

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Section III: Agriculture, Food, Forestry Chair: Nicola Cavallini	
17:05-17:20	O-33 Monitoring of Total Acidity Content in Continuous Vinegar Fermentation Using a Self-made Setup with a Modified MEMS NIR Spectrometer Hui Yan Jiangsu University of Science and Technology, China
17:20-17:35	O-34 Determination of Vegetable Oil Oxidation Causes by Near-Infrared Spectroscopy Yurika Otoki Tohoku University, Japan
17:35-17:50	O-35 Indices of marine finfish physiological condition to enhance fisheries research, monitoring capabilities, and management Esther Goldstein National Oceanic and Atmospheric Administration, USA
17:50-18:00	O-36 Measurement of 6-gingerol and 6-shogaol in ginger using NIRS Joel Johnson CQ University Australia
18:00-18:10	O-37 Non-Destructive Detection of Chilling Injury in Kiwifruit with a Dual-Laser System Mark Wang New Zealand Institute for Plant & Food Research
18:10-18:15	BREAK
Section III: Agriculture, Food, Forestry Chair: Panmanas Sirisomboon	
18:15-18:30	O-38 Texturized vegetable proteins surface characterization with NIR hyperspectral imaging Giacomo Squeo University of Bari Aldo Moro, Italy
18:30-18:45	O-39 Freshness Evaluation of Stored Cabbage: An alternative to the gene-expression based method Miho Sesumi National Agriculture and Food Research Organization, Japan
18:45-18:55	O-40 Development of an adulterant detection model (starch and chalk) for quality control of garlic powder Kelly Patarroyo León Universidad Nacional de Colombia, Colombia
18:55-19:05	O-41 Data fusion strategy combined with chemometrics to trace the origins of Tibetan medicine Meconopsis integrifolia (Maxim.) Franch. from Qinghai-Tibet Plateau Duo Li Northwest Institute of Plateau Biology, China
19:05-19:15	O-42 Spectral Denoising Method Based on Variational Mode Decomposition Mengxuan Ling Tiangong University, China

NIR spectroscopy coupled with chemometrics to discriminate between fresh and thawed cephalopods

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Food fraud is a widespread problem, which has potentially heavy and wide impacts on the consumers' safety and health, as it affects almost any type of food commodity that is sold on the market. Illegal practices such as product mislabelling and counterfeiting are under any circumstances a violation of the law but may be very difficult to detect.

Starting from these premises, we carried out a study aimed at investigating a specific type of food fraud: the sale of frozen-thawed cephalopods mislabelled as fresh, and therefore more expensive, products. The differences between fresh and thawed cephalopods were investigated, using three different NIR instruments to collect the data, followed by chemometric modelling to build classification models.

Fifty fresh cephalopods specimens of both cuttlefish (*Sepia officinalis*) and musky octopus (*Eledone spp.*) were collected directly at a food distribution warehouse and immediately analysed at refrigeration temperature (~5°C). Then, the specimens were kept frozen at -20°C for at least 48 hours and eventually thawed and analysed once again. Spectral data were acquired by measuring the same specimens using three different NIR spectrometers: one portable low-cost instrument (SCiO by Consumer Physics), one portable medium-high-cost instrument (MicroNIR by Viavi) and one benchtop instrument (MPA by Bruker).

From the output of each instrument, one classification model was built. All models showed very good performances, allowing discriminating between fresh and thawed samples with high accuracy. More specifically, the obtained accuracy values were, respectively: 82.3–94.1% for cuttlefish, 91.2–97.1% for musky octopus and 86.8–95.6% for the global model (i.e., a model combining the two cephalopods' species). To date, there is no other classification method (not even histological) able to provide performances comparable to this spectroscopic approach.

The best classification results were achieved using portable instruments, thus suggesting that an efficient and practical method for detecting the investigated food fraud might be further developed and deployed.

Keywords: food safety, food fraud, portable spectrometer