Department of Food Technology

HEALTHY FOODS

Society of Food Technocrats

2019

Bhai Gurdas Institute of Engineering and Technology, Sangrur-148001

Message

Dr. Guninderjit Singh Jawandha
Chairman
Bhai Gurdas Group Of Institutions

I am delighted to have the opportunity to release "Society of Food Technocrats", the annual college magazine. In this era of cut throat competition, apart study. One needs to have the holistic development of personality & this is our prerogative to chisel your thinking & persona here. The magazine will act as a platform for your creativity & writing aptitude & I intently believe that you would have an all-round development of your personality during your sojourn in this temple of learning. I congratulate the Director, staff & students for publishing "Society of Food Technocrats". I hope this issue would be meaningful, enjoyable & memorable in achieving its objectives.

Message

Prof. (Dr.) Tanuja Srivastava
Director
Bhai Gurdas Institute of Engineering and Technology

It is a matter of great pleasure for me to learn that Editorial Board is bringing out an issue of the College magazine "Society of Food Technocrats". I would like to appreciate those who have contributed articles for the college magazine as this shows the hard work, and the hidden potential of the students. I hereby congratulate those who contributed for the college magazine and welcome those who want to avail the opportunity next time.

Prof. (Dr.)Tanuja Srivastava
Director

Message

Dr. Syed Insha Rafiq
Head of Department
Food Technology

I am happy that department of Food technology is publishing yet another issue of "Society of Food Technocrats 2019"This magazine is by the student & for the Students. It aims at providing a platform to the students to explore their latent Capabilities & talent, to express their creativity and to develop their technical skills as you scan through the pages of the magazine, it will enlighten you with the important milestone the department has achieved this year. Beside, our budding talent have expressed their thoughts, ideas, hopes, feelings, aspirations & Convictions in a creative way.

I congratulate the editorial board for unleashing the hidden potential of the students & appreciate them for their effort in bringing out their issue.

Wishing the magazine a lasting success.

Dr. Syed Insha Rafiq
Head of Department
Food Technology

Message

Er. Swati Priyadarshi
Assistant Professor
Food Technology

It gives us great pleasure to bring you another issue of "Society of Food Technocrats", the college magazine of Bhai Gurdas Institute of Engineering & Technology. The name and fame of an institute depends on the caliber and achievements of the students and teachers. The role of a teacher is to be a facilitator in nurturing the skills and talents of students. This magazine is a platform to exhibit the literary skills and innovative ideas teachers and students. "Society of Food Technocrats" presents the achievements of students and contributions of teachers. We would like to place on record our gratitude and heartfelt thanks to all those who have contributed to make this effort a success. We profusely thank the management for giving support and encouragement and a free hand in this endeavour. Last but not the least we are thankful to all the authors who have sent their articles. We truly hope that the pages that follow will make an interesting read.

Er. Swati Priyadarshi
Assistant Professor
Food Technology

Students Editor's

1. Varinda Gupta (FT 8th)
2. Prince Goyal (FT 8th)

Vision of the Department:

To create competent and skilled human recourses involved in the improvement of quality and safety of the rapidly growing food processing sector.

Mission of the Department:

M1: To excel in teaching by offering technical/professional education imbibing ethical and moral values.

M2: To provide knowledge and skills in the areas of food processing, hygiene and safety of processed food products.

M3: To impart students with a vibrant technical knowledge to handle problems by collaborating with food industry.

M4: To promote the research and development activities of students to produce quality food products with the scope.

PEO's of the Department:

PEO1: To provide students with the basic knowledge, skills and use of latest technologies in food science that help in lifelong learning and self education.

PEO2: To acquire theoretical, practical knowledge and Industrial exposure of Food Processing Sector to become a qualified Food Technologist.

PEO3: To provide students with overall competency by inculcate skills, technical writing and communication skills as professionals.

CONTENTS

1. Recent advances in processing technology to reduce 5-hydroxymethylfurfural in foods

5-Hydroxymethylfurfural (5-HMF) is a neo-formed contaminant arising in foods during thermal processing, especially under acidic conditions. Exposure to 5-HMF is inevitable for human beings since it is widespread in foods, including honey, bread, beer, coffee, fruit juices, and black garlic. The many studies published to date have shown that 5-HMF displays diverse effects on human health, including carcinogenicity, neoplastic transformation, and hepato- and nephrotoxicity, and antioxidant activity. Therefore, reducing the amount of 5-HMF in foods has become an important food safety issue.

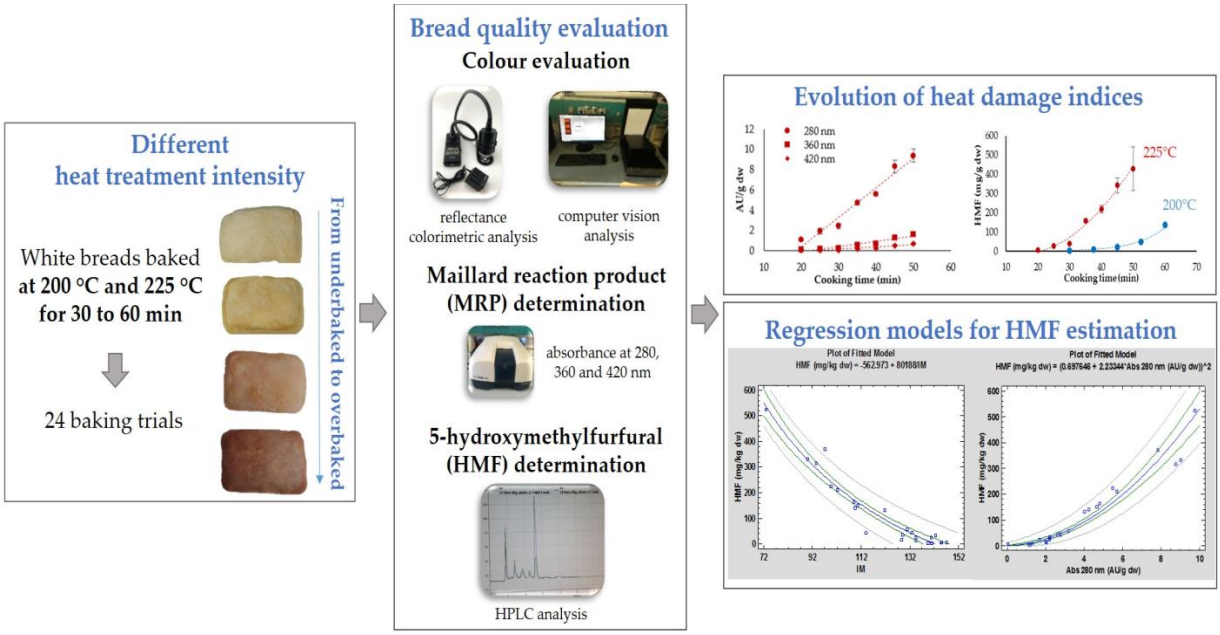

Fig1.1 5-hydroxymethylfurfural in Bread quality evaluation.

Internet and Communication Technologies, blockchain in the food supply chain and other Industry 4.0 applications, as well as approaches that redefine the way we consume food (e.g., lab-grown meat, plant-based alternatives of meat, and valorization of a vast range of bioresources), are the innovations with the highest potential in the new era. There is also an equally pressing need to exploit social marketing to understand attitudes, perceptions, and barriers that influence the behavior change of consumers and the agri-food industry. Subsequently, this change will contribute to adapting to new norms forged by the COVID-19 pandemic, where there is a significant gap in knowledge for decision making.

Diksha sharma (FT 6th)

2. Challenges on the processing of plant-based neuronutraceuticals and functional foods with emerging technologies: Extraction, encapsulation and therapeutic applications

Natural neuronutraceuticals and functional foods are provided by antioxidant molecules that inhibits excessive reactive oxygen species in neurons and simultaneous occurrence of brain-related injuries like depression, dementia, and ischemic stroke. The need for efficient, cheap and sustainable techniques to increase the shelf life and bioaccessibility of natural antioxidants for therapeutic application as replacers to synthetic antioxidants is growing.

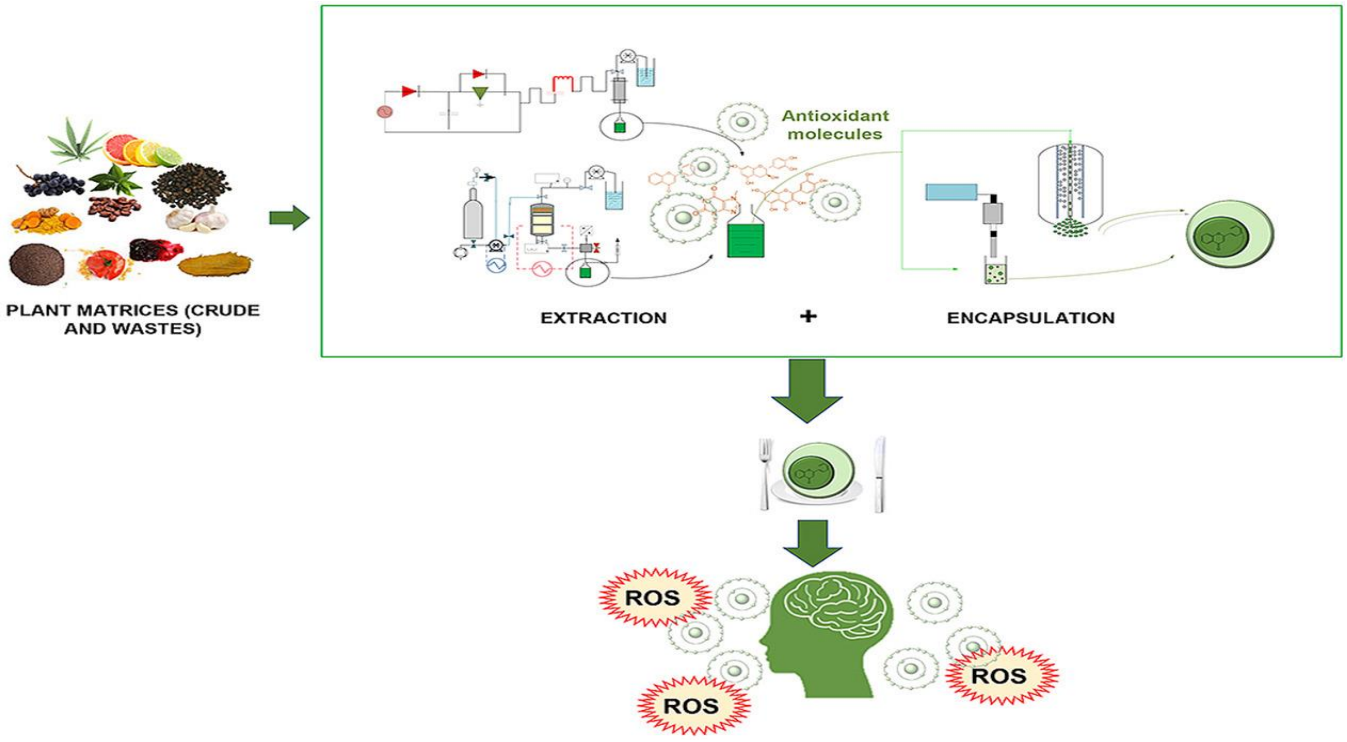

Fig 2.1 Plant-based neuronutraceuticals and functional foods therapeutic applications.

A number of different techniques have emerged to enhance the release of antioxidants after digestion, but the combined extraction + encapsulation process, even with assistance of probiotics or enzymes, is a trend that needs more information on the economic feasibility of the process and health of consumers.

Prince Goyal (FT 8th)

3. Glass transitions as affected by food compositions and by conventional and novel freezing technologies: A review

Stability of food is a great challenge that encompasses the interaction among the constituents, processing conditions and thermal history. The frozen storage of food sometimes incurs possible harmful effect due to the formation of large ice crystal and destruction of the cell structure. Glass transition state is a second-order transition of matter where a system reaches a thermodynamically non-equilibrium state due to the immobility of molecules, and it is a universal phenomenon observed when liquid goes to supercooled vitreous state because of extensive cooling or change in the composition. The cryostabilisation or storage at glassy conditions has been studied widely as it can prevent the quality degradation due to freezing..

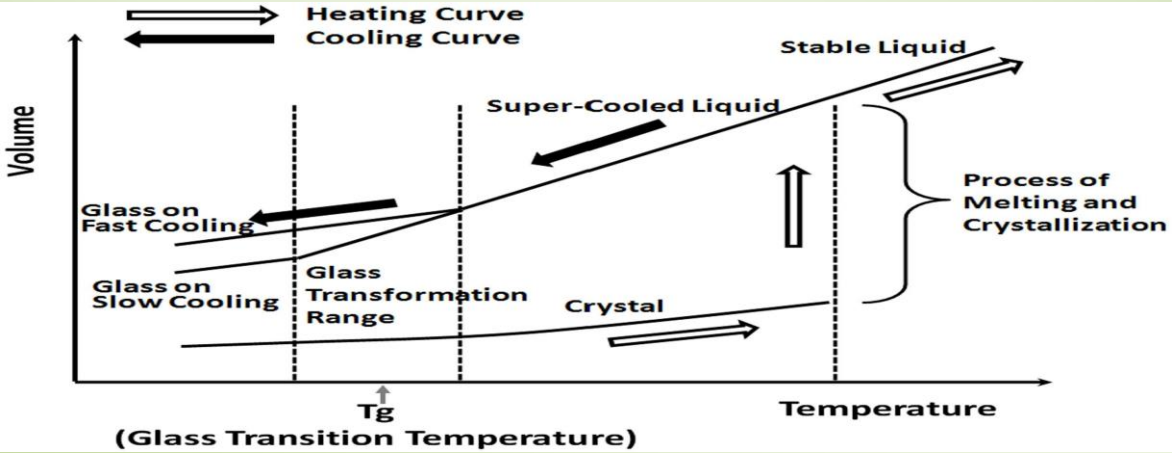

Fig 3.1 Glass Transition temperature curve.

The glass transition is highly dependent on the presence of moisture and carbohydrate molecules for its great affinity to make hydrogen bond and increase viscosity. The fat and protein glass transitions take place at very low temperatures, at which commercial frozen storage is not considered feasible. Conventional freeze drying and dehydrofreezing require removal of water, which increases the glass transition temperature. Storage at or below the glass transition temperature is desired to increase stability and prevent any quality deterioration. Novel freezing processes such as high pressure, ultrasound, electric and magnetic assisted freezing incur changes in microstructure and metastable glassy states.

Varinda Gupta (FT 8th)

4. Recent applications of omics-based technologies to main topics in food authentication

Food adulteration, mislabeling and fraud, either unintentional or deliberate, is a worldwide and growing concern. Current challenges associated with food authentication comprise many topics: geographic origin, breed/variety identification, production method, feeding regime, technological processing, undeclared components, detection of genetically modified organisms and species substitution are the most common frauds. Accurate and reliable analytical methods are needed to monitor and control food authenticity and to guarantee correct and accurate labeling of foodstuffs, assuring that the components included in a food product are of the nature and quality declared by the seller. Omics-based massive molecular tools can help to circumvent limitations of traditional methodologies, and therefore genomics, proteomics and metabolomics-based methods are being developed for the authentication of a wide range of food commodities. In this review, we provide an updated, comprehensive and balanced overview of the recent studies (2015–2018) that have applied these omics-based technologies for the authentication of food features.

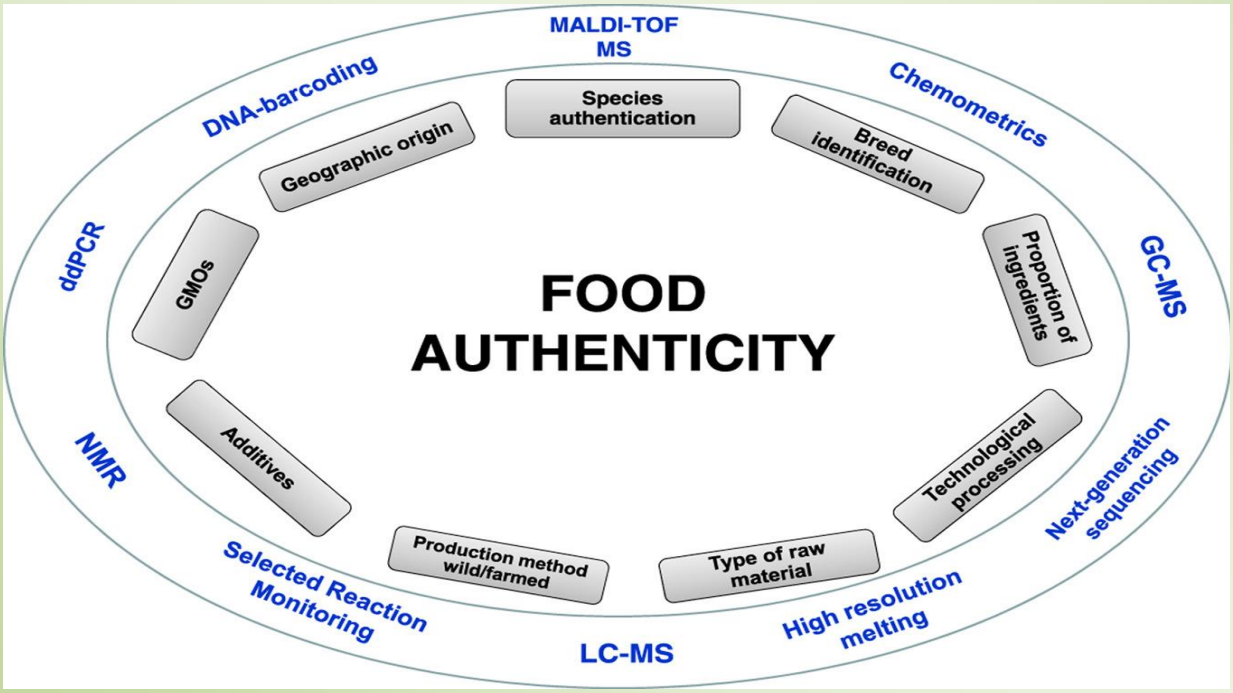

Fig 4.1 Omics-based technologies to main topics in food authentication.

5. Effect of thermal and non-thermal techniques for microbial safety in food powder: Recent advances

Food powders are appreciated worldwide, as it enables food to be preserved for an extended period without significant loss of quality, even under the ambient storage condition. However, it is evidenced that the development of resistant microbial spore and viable microbial cells is a matter of concern even in low moisture foods like food powders. For microbial inactivation, the strategy generally applied is the implication of conventional preservation methods, such as heat treatment which is greatly accompanied by degradation of nutritional organoleptic properties. To overcome the shortcomings of conventional thermal processing, a set of advanced or emerging technologies are being developed which can inactivate the microbial spores and viable microbial cells capable of surviving with maximum retention in the nutritional or organoleptic profile.

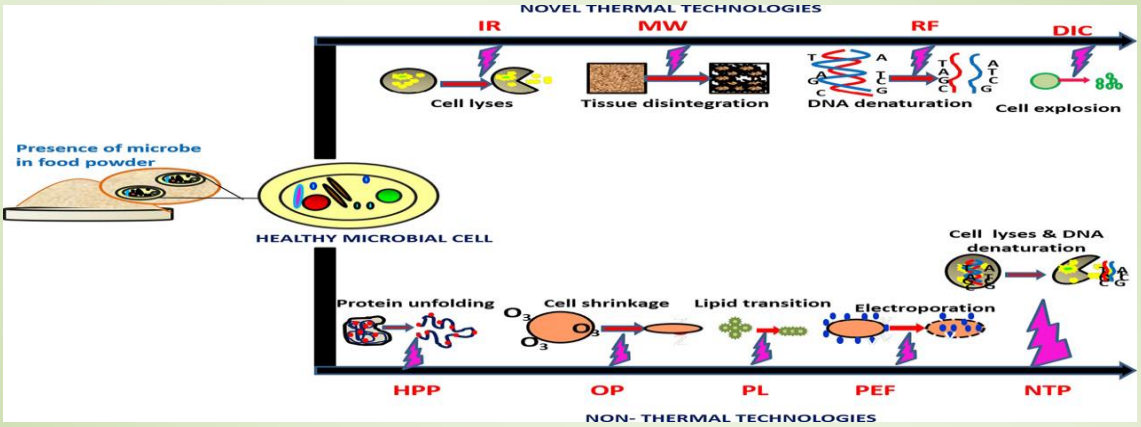

Fig 5.1 Novel thermal and non-thermal techniques for microbial destruction.

The examples include infrared heating, microwave heating, radiofrequency heating, instant control pressure drop technology, high-pressure processing, pulsed electric field, pulsed light, ozone processing, and cold plasma. In this review, the potential of different advanced thermal and non-thermal technologies towards the inactivation of spores and viable cells of microorganisms in food powders has been highlighted precisely along with their mechanism of action. The summary of the literature encompassing the use of different processing techniques will help the readers to understand the underlying mechanism of microbial inactivation associated with each processing techniques applied to powders. Eventually, this information will help them to select the suitable technique (individual or in combination with another counterpart) to inactivate spores and viable cells in a specific food powder.

6. Current advancements in chitosan-based film production for food technology; A review

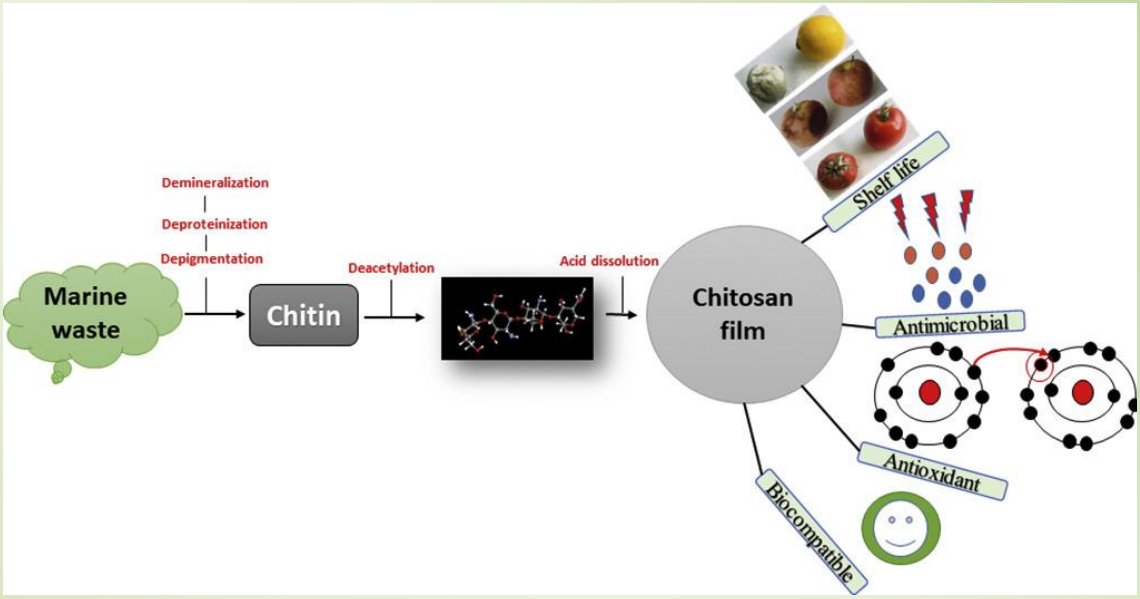

Fig 6.1 Role of chitosan-based film production in food industry.

Chitosan is obtained from chitin, which could be considered to be the most abundant polymer after cellulose. Owing to these properties, chitosan alone or chitosan-based composite film production is attaining huge attention in terms of applications from researchers and industrialists coming from divergent fields. To enhance the biological (mainly antimicrobial and antioxidant) and physiological (mainly mechanical, thermal and barrier) attributes of the chitosan-based films, a vast medley of plant extracts and supporting polymers has been blended into chitosan films. Considering the up to date literature reports based on chitosan film production and applications, it can be stated that still, the research ratio is low in this field. Chitosan blend/composite films with specific properties (superhydrophobicity, excellent mechanical strength, acceptable barrier properties) can be produced only for specific applications in food technology. In the current review, we tried to summarize the advancements made in the last 5–7 years in the field of chitosan film technology for its application in the food industry.

7. Current trends and recent advances on food authenticity technologies and chemometric approaches

Food frauds and counterfeit products produced to obtain economic advantages have become a growing concern over the last decade. The assessment of food safety and authenticity constitute a powerful tool to mitigate this problem and protect public health. Nevertheless, the growing sophistication of fraudulent practices requires a continuous update and improvement of the analytical methodologies.

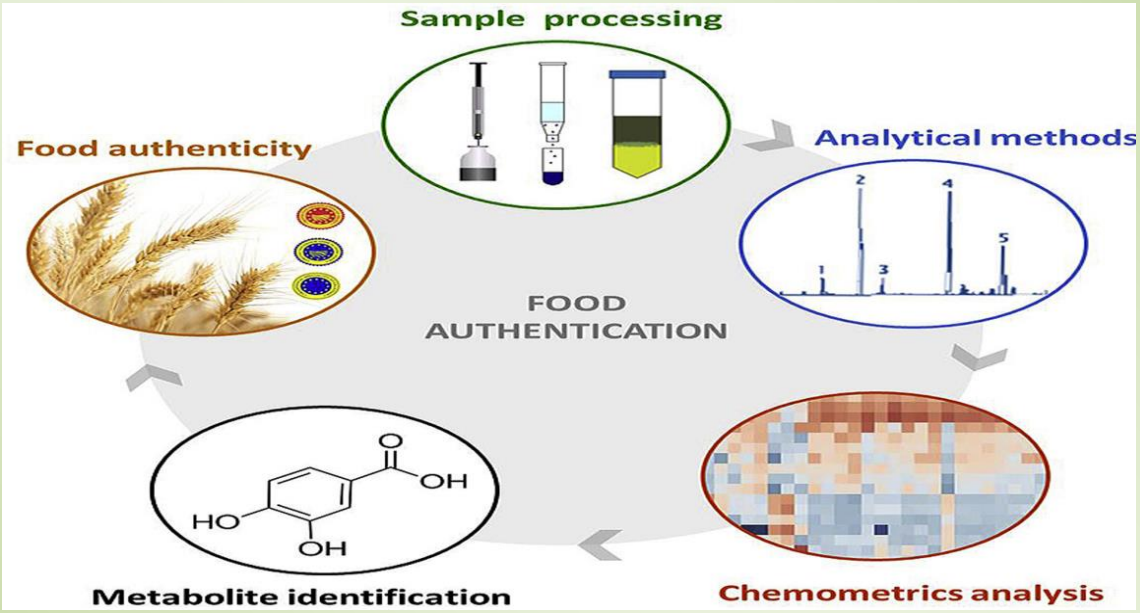

Fig 7.1 Food authenticity technologies and chemometric approaches for safety of food.

GC-MS, LC- q-TOF-MS and NMR followed by PCA and PLS-DA are the most often reported analytical methodologies to discriminate between authentic and non-authentic foodstuffs using chemical fingerprints. More recently, novel and promising statistical methods with high classification power (DD-SIMCA, OO-SIMCA, BPR, *k*-NN, among others) are being already applied. Overall, the development of non-destructive, on-site and real-time analytical procedures able to deliver fast and unambiguous food authentication results will continue to be the goal driving food research.

Harjot Singh (FT 6th)

8. Review on the food technological potentials of gas hydrate technology

Gas hydrate technology has been known for a long time, but has only recently gained interest in food technology field. A major advantage for food technology applications are the gentle conditions under which products can be refined using gas hydrates, therefore not altering or damaging valuable product contents. This review discusses recent developments of hydrate applications for different areas of food technology for example concentration and purification processes, the preservation of foodstuff as well as novel product designs.

Gas hydrates can be used in a wide range of food technology applications. Even though the technology is rather new in this field it shows great potential regarding the current state of the art as the presented studies reinforce. The most commonly perceived benefits are mild formation conditions leading to energy savings and the preservation of the sensory and nutritional profile of the foodstuff.

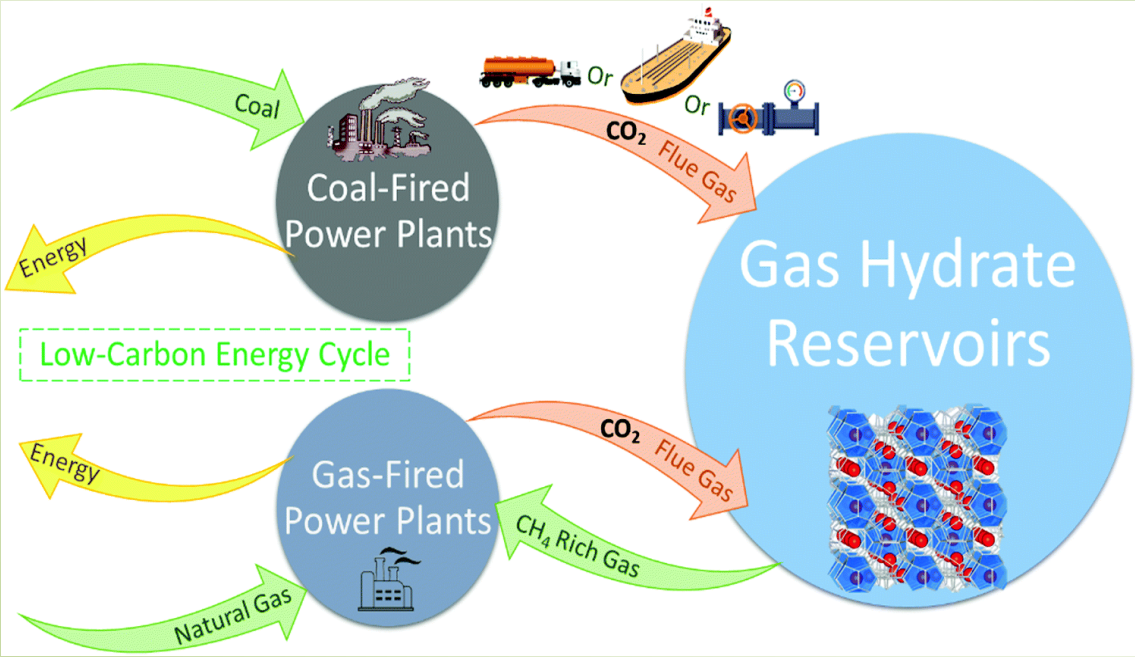

Fig 8.1 Food technological potentials of gas hydrate technology.

Gurpreet Singh (FT 8th)

9. Recent advances in Raman technology with applications in agriculture, food and biosystems: A review

Raman technology, which covers Raman spectroscopy (RS) and its various derivative methods, has been widely applied in detection of various substances in agriculture, food and biosystems. This article reviews the recent advances in two mainstream Raman technologies as RS and SERS, including technical evolution, application and challenges, and spectral processing methods. Firstly, the origin, principle, defect, and development of RS were introduced. Then, the current situation, existing problems, and development trend of RS and SERS were discussed in agriculture, food, and biosystems, such as adulteration recognition, plant diseases identification, farm chemicals detection, food additives determination, and toxins analysis. At last, the spectral analysis methods include noise reduction, feature extraction or variable selection, and modeling were introduced in detail, which can realize the automatic and intelligent analysis of spectra without relying on professionals.

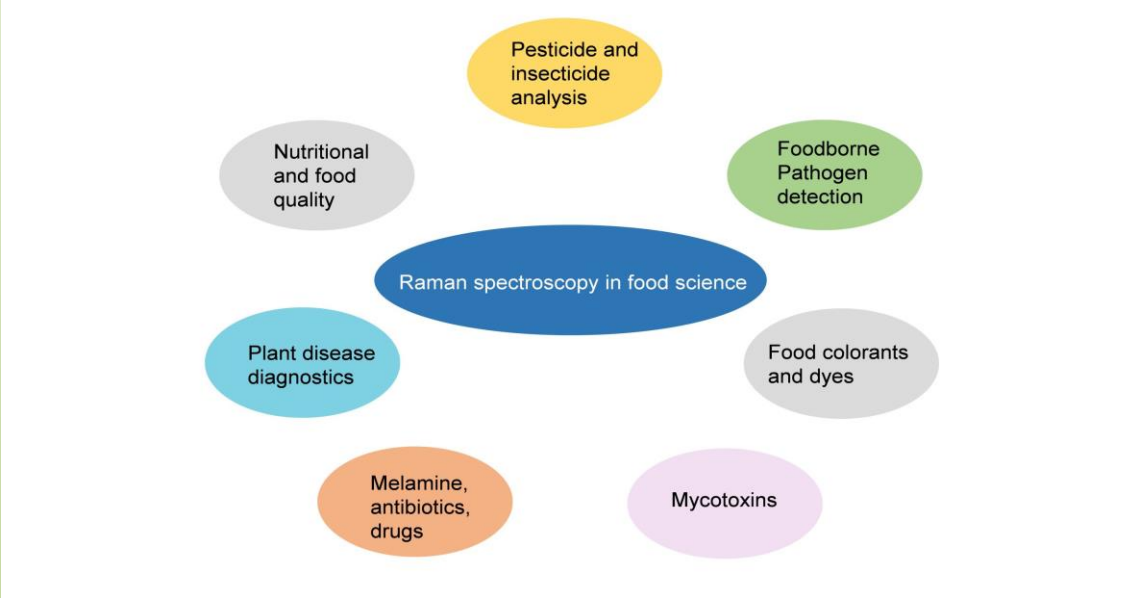

Fig 9.1 Application of Raman Spectroscopy in food science.

Gursewak Singh (FT 8th)

10. Membrane separation technology for the recovery of nutraceuticals from food industrial streams

Nutraceuticals are bioactive components that deliver health benefits on top of their innate nutritional value. With an increasing demand of nutraceuticals in the food as well as pharmaceutical sector, a continuous and inexpensive supply of nutraceuticals is much required.

Membrane technology can be used in dual fashion, i.e., industrial food waste treatment in combination with recovery of nutraceuticals, which will lead to a sustainable production of nutraceuticals. Moreover, the membrane technology offers a great flexibility in operation thus making it possible to work with variable feeds.

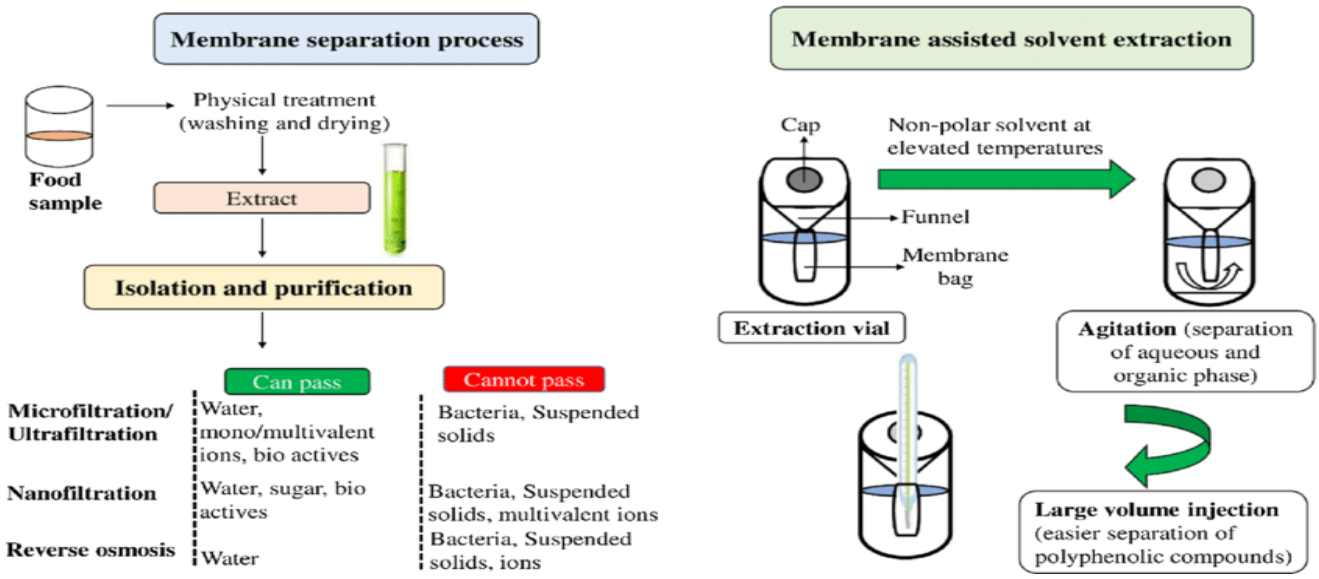

Fig 10.1 Membrane separation technology in Food technology.

Membrane separation is an established technology that can be applied for safe processing of nutraceuticals from food industrial wastes, both liquids and solids. In this regard, the recovery of nutraceuticals from fruit, dairy, cereal, seafood and meat processing waste are among the most investigated areas of membrane technology. However, the actual potential of this technology is expected to be much higher, which is still pretty much in its infancy.

Deepak (FT 8th)