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BIOSENSORS IN FOOD INDUSTRY

CONTENTS...

THE BOOMING BIOSENSORS

Food processing industry faces various challenges…One of the foremost challenges is the need of quick and cost effective methods to detect the presence of allergenic components and pathogens in the food. BIOSENSORS pave way for the rapid detection of pathogens, allergens as well as the pesticide residues in food. Detection of contaminants, verification of product contents, product freshness and monitoring of raw materials conversion are the areas of potential biosensor applications. Generally in the food and agricultural industries, chemical and microbiological analyses are done periodically by trained operators, which are expensive and require steps of extraction or sample treatment, increasing the time of analysis. Biosensors can overcome all these disadvantages by offering a rapid, non-destructive and affordable methods for quality control. Biosensors have the potential to produce an analytical revolution to resolve the challenges in the agricultural and the food industries. This article gives on overview of biosensors and its role. Biosensors act as analytical devices employing a biological material or biomimic as a recognition molecules integrated within a physicochemical transducer or transducing Microsystems. The outcome of this is a digital electronic signal proportional to the concentration of a specific analyte or analytes.

The first mediated amperometric biosensor was developed in **1984** by using ferrocene used with glucose oxidase for glucose detection. Biosensors are used in various fields, with miniaturization and reduced cost has further increased the analytical capabilities of such device. Biosensors research is booming around the world and the area of applications range from medical to agriculture. The types of instruments required for the agro-food diagnostics market can be divided into large multi-analyzers, bench top portable instruments and one shot disposable sensors. Many of the instrumentations developed to date were for the medical diagnostics market. Many compounds including heavy metals used in different fields of industry or agriculture act as inhibitors of enzymes, which as consequence are unable to find the substrate. Even if it is not so sensitive, the methods for detecting heavy metal traces using biosensors has a dynamic trend and is largely applied for improving the "life quality" , because of biosensor's sensitivity , selectivity and simplicity. In the last years, they also become more and more a synergetic combination between biotechnology and microelectronics. Dedicated biosensors were developed for offline and online analysis and also their and extent and diversity could be called as a real **"BIOSENSOR REVOLUTION".** A panel of examples of biosensors are DNA, immune whole cell based biosensors were systematized depending upon the reaction type, transduction signal or analytic performances. The mechanism of enzyme based biosensor and the kinetic of detection process are described and compared. In this context, is explainable why bioelectronics, nanotechnology, miniaturization and bio-engineering will compete for developing sensitive and selective biosensors able to determine multiple analytes simultaneously and integrated in wireless communication systems. There are several applications of biosensors in food analysis. In the food industry, optics coated with antibodies are commonly used to detect pathogens and food toxins. Commonly, the light system in these biosensors is fluorescence, since this type of optical measurement can greatly amplify the signal . A range of immuno and ligand-binding assays for the detection and measurements of small molecules such as water soluble vitamins and chemical contaminants such as sulfonamides and Beta-agonists have been developed for the use on SPR based sensor systems. These are in widespread use across the food industry.

HANIYA AZFAR FATHIMA

PHOTO CREDITS: PINTEREST

ANNATO COLORS

an organic dye

The general human beings are the creatures who are attracted by colors. Interestingly it applies to food also. Yes, colored foods just attract and increase our palatability, it just urges us to eat, but only in recent times. May synthetic coloring agents are used in foods. So here we go with an organic coloring agents **"Annatto"**- it is an real orange-red condiment which imparts yellow or orange color to foods and derived form achiote tree. The color of annatto comes from various the pigment mainly bixin, found in the reddish waxy coating of the seeds. The origin of annatto tree is Brazil. Initially it was not used for food additive but for insect repellants, medical purpose and body paining. Later it was used by Latin Americans and Caribbean as flavoring and coloring agents. The colors annatto was extracted by leaching pericarp of the seeds by using extractant which may be organic solvents such as edible vegetable oils, alkaline or alcoholic solutions ,lard (pig fat). If the pericarp is leached in alkaline aqueous solution it is water soluble annatto and when leached in edible vegetable oil, it is oil soluble annatto. There is a little drawback, that the annatto color deteriorate with age. There will be considerable amount of precipitates deposits with corresponding decrease in their ability to impart colors. Some factors involve in affecting their tinctorial power. The annatto colors expects the cold storage and decomposes at faster rate with higher concentration of initial pigment. They often exhibit friendly relationship with darkness, the storage in stainless steel container and under vacuum favors long-lasting annatto colors. The vacuum storage is preferred because the atmospheric layer reaches the color their tinctorial power also decreases at faster rate at alkaline. The determination of annatto color is done by Gravimetric, Calorimetric and special assay method in that assay method is entirely accepted. Annattos chief application is coloring butter and cheese. It is used as condiments in good products. Ground annatto foods often mixed with other seeds or spices in form of paste or powder for culinary use. Annatto is mainly used to impart yellow or orange color is industrialized and some industrialized foods. Annatto is informally considered to be a natural coloring, food colored with annatto can be declared by **"colored with annatto" or "annatto colors"**. Annatto condiments and colorants are safe for most people when used in food amount, but they may cause allergic reaction in those who are sensitive. The food and drug administration (FDA) experts at the food allergy research and research program do not include annatto in the list of major food allergens. A package containing annatto color in vegetables will bear the label **ANNATTO COLOR IN OIL**, (name of oil/oils) used. According to BIS, annatto color shall be prepared only from the seed of annatto and shall not contain extraneous coloring matter with the present consumer trends towards the use of manual food coloring annatto has tremendous potential in domestic and international fronts. Due to diversified use and easy detectability adds colors to its trading aspects and good market in India and all over the world.

REFERENCE: https://en.m.wikipedia.org/wiki/annato

GOWSHIKA.K.S

BIODEGRADABLE MICROSENSORS:

A new approach in packaging

A new generation of microsensors could provide the vital link between food products and the Internet of Things. ETH researchers have developed an **ultra-thin temperature sensor** that is both biocompatible and biodegradable. Nowadays microsensors are already used in many different applications, such as the detection of poisonous gases. They are also integrated into miniaturized transmitter/receiver systems, such as the ubiquitous RFID chips. However, as the sensors often contain trace metals that are harmful to both the environment and human health, they are not suitable for applications involving direct contact with the human body or for inclusion in food products. Therefore a high level of interest, both in research and industry, in developing microsensors made from non-toxic materials that are also biodegradable. A team of researchers led by Giovanni Salvatore, postdoctoral researcher in the Electronics Laboratory, has been working with scientists from other ETH institutes on the development of biodegradable microsensors for temperature measurement of food samples. They have just reported their findings in the scientific journal Advanced Functional Materials. The biocompatible microsensors are created by encapsulating a superfine, tightly wound electrical filament made of magnesium, silicon dioxide and nitride in a compostable polymer. Magnesium is an important component of our diet, while silicon dioxide and nitride are biocompatible and dissolvable in water. The polymer in question is produced from corn and potato starch, and its composition complies with EU and US foodstuff legislation. Giovanni Salvatore is convinced that these biodegradable microsensors have a bright future. As an example, he cites one potential application: "In preparation for transport to Europe, fish from Japan could be fitted with tiny temperature sensors, allowing them to be continuously monitored to ensure they are kept at a cool enough temperature." This requires sensors that are suitable for use in foodstuffs and are no threat to consumer health. The sensors also need to be small, robust and flexible enough to survive in containers full of fish or other food products. The sensor developed by researchers is only 16 micrometers thick, making it much thinner than a human hair (100 micrometers), and – being only a few millimeters in length & weighs no more than a fraction of a milligram. In its current form, the sensor dissolves completely in a one-percent saline solution over the course of 67 days. At present, the sensor continues to function for one day when completely submersed in water. This time would be sufficient to monitor a shipment of fish from Japan to Europe. "But it's relatively easy to extend the operating life by adjusting the thickness of the polymer," Salvatore says. A thicker sensor would be less flexible, however. The current sensor is so thin that it continues to function even if it is completely crumpled or folded. Even when stretched by around 10% of its original size, the sensor remains intact. A lot more research is still required before these components can be used without concerns for human health or the environment. The team is therefore currently searching for a biocompatible energy source to power its sensor.

REFERENCE: https://www..ncbi.nlm.nih.gov/pmc/articles/PMC3671056/

NACIBA .N

BIOTREATER

A solution for waste water utilization

In food processing plants, water use starts with conditioning raw materials such as soaking, cleaning, blanching and chilling. It continues with cooling, sanitizing, steam generation in sterilization, power and process heating, and finally direct "in process" use. Copious waste water is generated in food production. The water classification categories used in the food and beverage industries are general purpose, process, cooling and boiler feed. Food waste water residues that deplete the oxygen in receiving streams. Chemical oxygen demand (COD) and biochemical oxygen demand (BOD5) are common measurements used to determine water quality. They measure the strength of the water stream by measuring the oxygen required to stabilize the wastes. COD and BOD5 are important to the food processing industry because

High BOD5 and COD levels indicate increased amounts of product lost to the stream. Measurements at various process location can help locate sources of waste. At any point in a particular food processing, the relationship between BOD5 and COD is fairly consistent. However, the ratios of these two measures vary widely depending on the type of product. A biotreater is an anaerobic treatment system that is the combination of number of operations. The basic concept is that of a tank within a tank using common wall construction. The central tank is normally a COP clarifier which treats the effluent prior to discharge. The outer tank is divided into sections, each performing a different operation. The uses of waste water treatments are helping manufacturers to produce quality final products by supplying high grade portable water. It reduces production cost and improve profits for manufacturers. It manages waste and sludge, adding benefit by recovering resources. It generate energy from waste and sludge and it reduces overall raw water intake. It helps in achieving zero liquid discharge for better environmental practices.

REFERENCE: https://www.foodprocessing.com/articles/2016/understanding-food-and –beverages-wastewater-solutions/

RANJANI PRIYA. S

POC BASED BIOSENSOR

Biosensors are cutting edge analytical devices used for the detection of biological targets including antibodies, enzymes, single-stranded DNA and aptamers. Here we are discussing a biosensor which is particular in detecting food allergens. This comes under the electrochemical type of biosensors. Electro chemical biosensor is a self-contained biosensor that provides semi-quantitative or qualitative data based on electro chemical transducer. Here comes the hero of this page POC. So what is POC? It is an emerging innovative technology which could be simply defined as "testing at or near the site of patient care whenever the medical care is needed", which is exactly what food allergen detection needs. A POC technology involves only a few steps with a small sample and needs to yield an initial result within minutes. Most of the POC technologies utilize single-use strips or cartridges with built-in readers, and generates either quantitative or qualitative results. Advanced POC detectors have more robust functions, which includes unrefrigerated sample storage, more sensitive and specific detectors. At present it includes multiple designs such as hand-held, label-free, miniaturized and smart phone platforms. One hand held biosensor can detect mono and bilayer proteins down to three nanometre thickness. Label free technology in POC devices offers more convenience and they costs lower. This sensor is applied to molecularly imprinted polymers and can detect nucleic acids and antibodies. Miniature POC technology makes a device portable and easy to use. It can detect pesticides in solutions and oils marketed for consumption, which may induce food allergies. The smartphone has taken this technology to next level as it can be used directly as a sensor interface and offer new potential for point of need and point of care allergen detection platforms. When used in combination with biosensor techniques, a smartphone platform for food allergen is an ideal approach. Ultimately, POC technology shows a strong potential as a tool in detecting food allergens and their Immunoglobulin E (IgE) antibodies. Its response to food includes IgE and non-IgE involved hyperactive reactions. This technology can be applied in detecting allergens over a wide range of food sources like egg, milk, peanut, gluten, and fish. They offer conducive and rapid detection methods to identify food contamination, adulteration and most importantly to protect hypersensitive individuals. Currently nano materials are also being used in this technology because of their specificity, rapidity, lower costs and on-site detectability. The combination of POC and Nano materials comes out with a very creative and useful result.

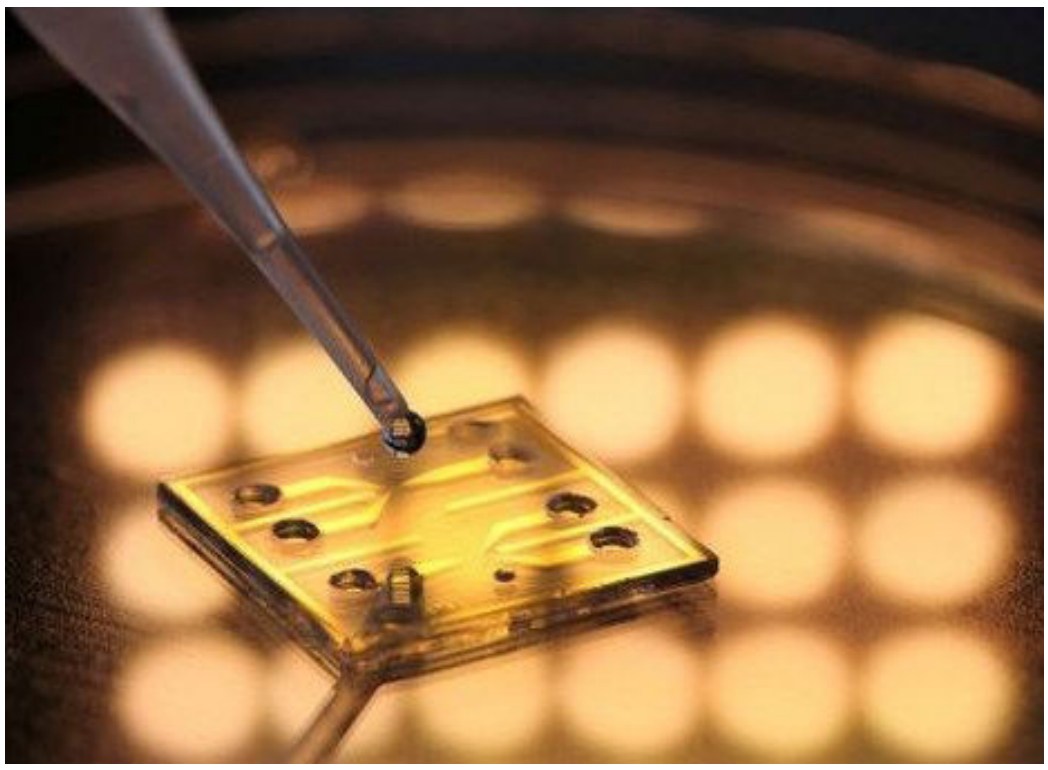
The advantage of nano materials in POC biosensors is their capacity to immobilize bio-affinity agents which makes the sensor to detect that easily. They also have optical properties that enhance interactions with bio-affinity targets such as DNA nucleotides and antigens. The most commonly used nano materials are quantum dots and gold.

Food allergens are common in childhood and adulthood. At present, these interactions become more complex and worse and we people are poorly concentrating on it. Point Of Care devices can notably advance food allergen monitoring and will help hypersensitive individuals to prevent themselves from severe allergic responses or death. Nano materials designed for POC devices are being widely used and new POC based biosensors are yet to be emerged which could definitely offer a promising future that can address the challenges of food safety monitoring.

REFERENCE: www.elsevier.com/locate/sbsr

CHARUMATHY. S

END TO CONTAMINATED WATER:



Right now, detecting suspecting contamination in water can take days, and that puts humans and animals at serious risk. But a new biosensor developed by graduate students in Denmark promises to spot unclean water in an instant, whether it's used in a village well in a rural community or a huge food production factory in the city, being able to spot contamination without lab tests or technical experts ensures the problem is caught before it has the chance to do damage. "I believe that our product will revolutionise the way microbiological water quality measurements are made," said **Erik Gustav Skands**, a graduate students from the Technical University of Denmark and CEO of the tech start up, SBT Aqua. The new sensor works through a technique called **impedance flow cytometry**: liquid is monitored via electrodes that carry multi-frequency voltage signals, and when bacteria and particles hit the electrodes, the impedance is affected. Because the impedance change for bacteria is uniquely different from other non-organic particles, the sensor can indentify with a high degree of accuracy whether or not the water is contaminated. In fact, because the changes vary even between different types of bacteria, technology can simultaneously detect all types of bacteria present in the water. "Today, all commercialised technology to detect bacteria requires either staining, incubation, or manual sample-handling," explains the SBT Aqua team. This sensors can perform online and real-time measurements of the bacteria level in aqueous solutions with no pre-treatment of the sample, no incubation time, and no manual sample handling. Sensors can be placed throughout a particular network to detect problems at any particular point , even in place of flow of water. The conditions are continually monitored and an alert can be generated as soon as something doesn't look right .The graduate students are now working hard on product development and testing for a commercial launch.

REFERENCE: www.sciencealert.com

KOWSIKA. N

Hello readers!

Do you believe that the additives and chemicals used as preservative were not regulated and checked? To know the response for this myth, the fact is in the last page of this edition.

CODEX ALIMENTARIUS COMMISSION:

Ensuring Food Safety and Nutrition

The growth of population, agriculture and food trade has led to the spread of many contaminations and infections. The ***Codex Alimentarius***(also known as the **Bible of standards**) is a collection of internationally recognized standards, codes and guidelines regarding food production, food safety and assurance of consumer safety adopted by Codex Alimentarius Commission (CAC). The name codex alimentarius is taken from the Latin word meaning "food code" or "food law". Codex assures that any food produced in accordance with its codes is hygiene, safe and nutritious too. The difference in food standards of each country led to less acceptance and irregularities in accepting imported products. This led to the birth of codex whose standards are internationally accepted.

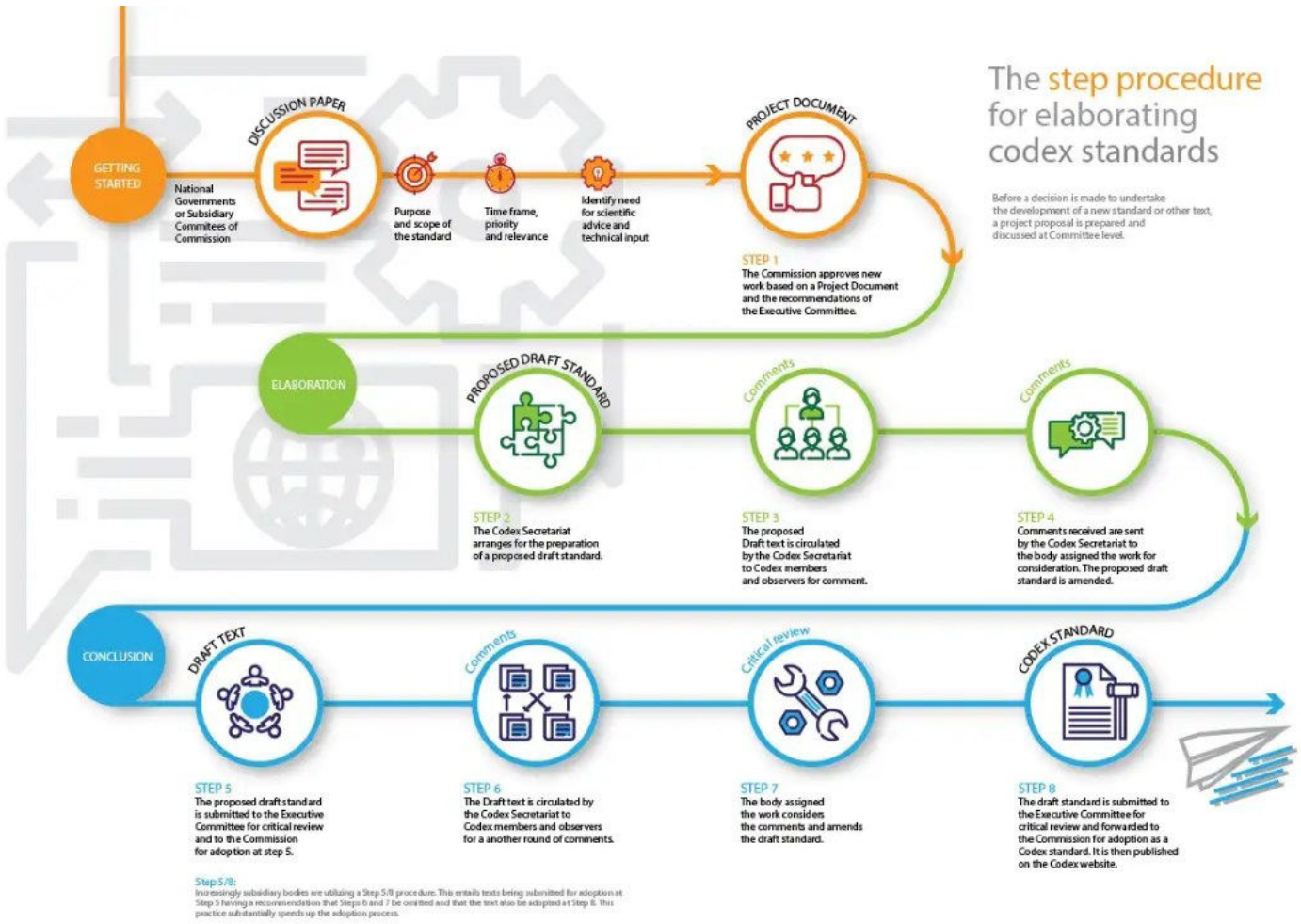
The CAC was created in 1962 by two United Nations organizations, the **Food and Agriculture Organization** (FAO) and the **World Health Organization** (WHO). The CAC is an intergovernmental body and has been responsible for implementing the Joint FAO/WHO Food Standards Programme. It consists of membership of more than 180 member governments in addition to which observers from international scientific, food industry, food trade and consumer associations can attend the sessions. The decision making process is headed only by the member governments.

THE CODEX STANDARDS PROCESS

Under the rules of CAC, it is empowered to establish two types of subsidiary bodies:

Codex Committees: This committee prepares the draft standards for submission to the commission.

Coordinating Committees: It is this committee through which regions or groups of countries coordinate food activities in the region including the development of regional standards.



THE CODEX STEP PROCEDURE

FUNCTION OF CODEX:

CAC has established has established guidelines for maximum tolerable levels for 25 common industrial and environmental contaminants of food. For over 1300 food additives, evaluation, and its acceptable usage levels have also been established. Even the pesticide chemicals have been evaluated and tolerance limits has been established.

For proper facilitation of international trade, necessary efforts are made to harmonize food standards. These standards should be appropriate to protect human, animal and plant health and the environment.

The standards thus established should not be a barrier to trade between countries. This will help in developing effective food regulatory system globally.

The commission ensures

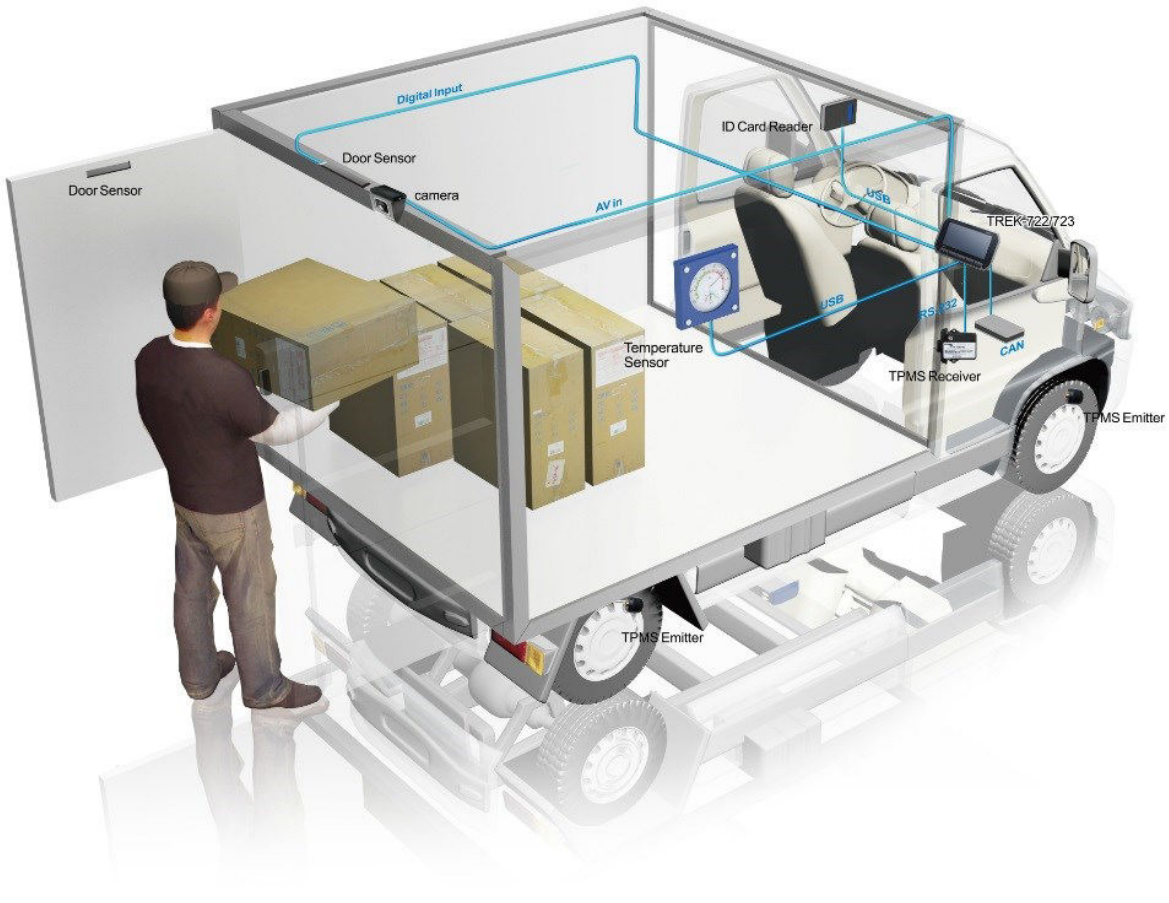
Greater efficiency and effectiveness in the development of standards, with transparency and procedural consistency.

Increased participation of developing member countries.

A stronger scientific base for risk analysis and effective building for the development of national food control systems.

P.L.MEENAKSHI

COLD CHAIN MANAGEMENT:



Cold storage being an integral component of postharvest management plays vital role in reducing postharvest losses of edible commodities by enhancing their storability and shelf-life. Timely storage of highly perishable and perishable commodities helps in their regular and continuous supply either for table or processing purposes. It is also highly beneficial in price stabilization, proper distribution and marketing of commodities. Realizing the significance of proper and timely storage, a strong growth is being for cold storage industry in near future. Presently, there are 6227 cold stores in India and the storage capacity up to 30.00 million tones. Broadly, horticultural/agricultural produce, processed food , animal husbandry produce and pharmaceutical items are being stored in cold stores. This article highlights present stores of cold stores, availability, utilization and use pattern of storage space along with major limitations. Article also suggests some of the ways in making the cold stores more effective and diversified in their use. In spite of huge progress at production level, situation with respect to postharvest management of fruits and vegetables has remained extremely discouraging in India. Around 61 million tonnes of cold storage capacity is presently required for food products (fruits and vegetables) in India. But , the actual available facilities can accommodate only 26.85 million tones. Lack of cold storage space for about 34 million tones of produce is one of the major reasons behind higher postharvest losses of fruits and vegetables in India which reach up to 25 to 40% of the total production on annual basis .Due to shortage of adequate storage space and associated infrastructure , gluts are very common at the time of harvest for edible commodities. Besides inadequate availability of cold storage space , there are other affiliated problems as well. They are 1.Unequal distribution cold stores 2.High cost of cold stores 3.Poor management of cold stores 4.No net working of cold stores.

As per the agenda set by the government of India, there will be emphasis on reducing postharvest losses through the development of technologies and improving the handling systems of perishable horticultural produce along with the integration of producers with marketers. For permanent and long term solution to the problem pretraining cold storage and cold stores there is urgent need for major policy decisions and initiatives for opening up of new cold stores along with rapid modernization of existing cold stores. Technologically modernized cold stores will ensure better monitoring temperature, relative humidity (RH), air storability, overall efficiency and prolonged maintenance of quality of the stored commodity .Fraction of total produce of fruits being processed in some of the developing countries is also quite high. Such figures for Malaysia, Philippines , Brazil and Thailand are around 83%,78%,70%and 30% respectively. Recently announced initiatives by government of India like 100%FDI under automatic route in food processing industry and food infrastructure including food parks, distillation and brewing of alcohol, cold storage chain and warehousing and five year tax holiday for new fruits and vegetables processing along with their benefits will definitely encourage this growth in this sector. It is important to mention that for all these schemes and initiatives, timely availability of cost effective cold storage space for short term (2 to 4 months) and long term (4 to 9 months) is critical and essential prerequisite. Keeping this on view of Mission of Integrated Development of Horticulture, yet another important initiative by the Government of India, will support postharvest handling of fresh farm produce through the development of cold-chain from farm-gate to consumers wherein financial grant of 35% to 50% of admissible cost will be provided.

BALASUNDARI.M

OXO-BIODEGRADABLE PLASTICS:

Greener alternative of plastics

Growing environmental concerns, increasing awareness of the economic & ecological viability of using biodegradable plastics led to the growth of the biodegradable plastics. Biodegradable plastics are the by-product of refining process. Decreasing number of petroleum reserves and the increasing cost of petrochemicals, increasing investments in research & development for greener alternative of plastics led to the Oxo-biodegradable plastics which degrades completely. EPI's TDPA (Total Degradable Plastic Additives) formulations is used in the production of Oxo-biodegradable additives. This leads to the development in technology, that is introduction of these additives into the plastics polyethylene (PE), polystyrene (PS), propylene (PP), polyethylene terephthalate (PET), that will actually accelerate the degradation of plastics in the environment. These additives are catalytic materials that speeds the degradation of plastics and releases carbon dioxide, water, and biomass . This technology adds transition metals of cobalt (Co), magnesium (Mg), or manganese (Mn), zinc (Zn), iron (Fe), or nickel (Ni) into the polymer. Plastics are incorporated with additives undergo a two step process: an oxidative process that is initiated by the additives that is then followed by biodegradation. On degradation Plastics are reduced into smaller and small particles due to actions of bacteria and fungi in the soil or disposal environment. There is no long term damage at all, as it has disappeared completely without any plastics fragments. On testing for ecotoxity shows positive results for plant growth , Organism survival for things such as earthworm and daphnia, and seed germination. It is safe to use with any food types at temperatures up to 40 C. The development of oxo-biodegradable additive technology is just one part of the global solution to the problem of reducing the major amount of plastics discarded into the open environment.

REFERENCE: www.biodeg.org,https://www.foodpackagingforum.org

KOWSIKA.N

WHO AM I?

Hello all! I was born on May 4,1818. I am an American scientist and inventor. During my life time, I worked as a photographer, glassmaker and inventor but my great invention was made during 1850s. After several unsuccessful trails, I had come up with the invention of modern chewing gums. I moulded them into small gumballs that were wrapped in different coloured tissue papers. I decided to expand my business after its initial success. Then in 1871, I made first flavoured gum in the world called "**Black Jack**" that had the taste of liquorice. Later I formed a new company called "American Chicle Company". I am very well known as the **'Father of modern day chewing gum industry' .** Can you guess me ?

Yeah! I'm THOMAS ADAMS

DONE BY:

CHARUMATHY.S

FORTIFICATION OF EDIBLE OIL :

A new regulation of FSSAI

The FSSAI is promoting food fortification in a big way and had issued standards for fortification of salt, wheat flour, milk , and rice. "All major edible oil manufacturing and processing sector decides to fortify the edible oil with vitamin A and D within next 3 months," FSSAI said in a statement. This regulation is the outcome of a meeting convened by the Food Safety and Standards Authority of India (FSSAI). According to National Institute of Nutrition, there is a high prevalence of vitamin A and vitamin D deficiencies amongst Indian population. Across all socio-economic groups, almost 50-90 percent of the Indian population suffers from vitamin D deficiency and 61.8 percent of the population suffers from vitamin A deficiency. FSSAI said the fortification of edible oils with vitamin A and D, offers the most feasible and cost-effective intervention, as India has a fairly high consumption of edible oils, ranging to 18kg per annum per person. Oil fortification is the process of adding micro nutrients to edible oil to increase its nutritional value and it is expected to achieve 99 percent of the Indian population due to the widespread use of cooking oil. The cooking oils used in India are soybean, palmolein, groundnut, cotton seed and mustard oil. Now FSSAI has made the fortification of edible oil mandatory across India and already 47 percent of the refined packaged oil are fortified nationally. Before the action of FSSAI on fortification of edible oil, fortification of oil was made mandatory in Rajasthan and Haryana. There are 27 countries across the world have mandated the fortification of edible oil. According to FSSAI, the cost of edible oil fortification is only 8-10paise per kg. The taste, color, appearance, texture and shelf life of the edible oil remain unaffected by this fortification process. Fortification process does not require special equipment as vitamin A itself is an oil in its natural form and is readily miscible with other oils and fats. Fortified oil is known to provide 25-30percent of the recommended dietary allowances for vitamin A&D. So fortification of edible oil became essential to treat the deficiency of micronutrients like vitamin A&D.

REFERENCE: www.fbnews.com, http://www.fssai.gov.in.

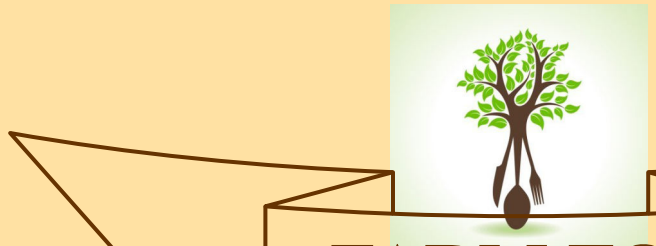
RANJANI PRIYA. S

PLASMONIC BIOSENSORS

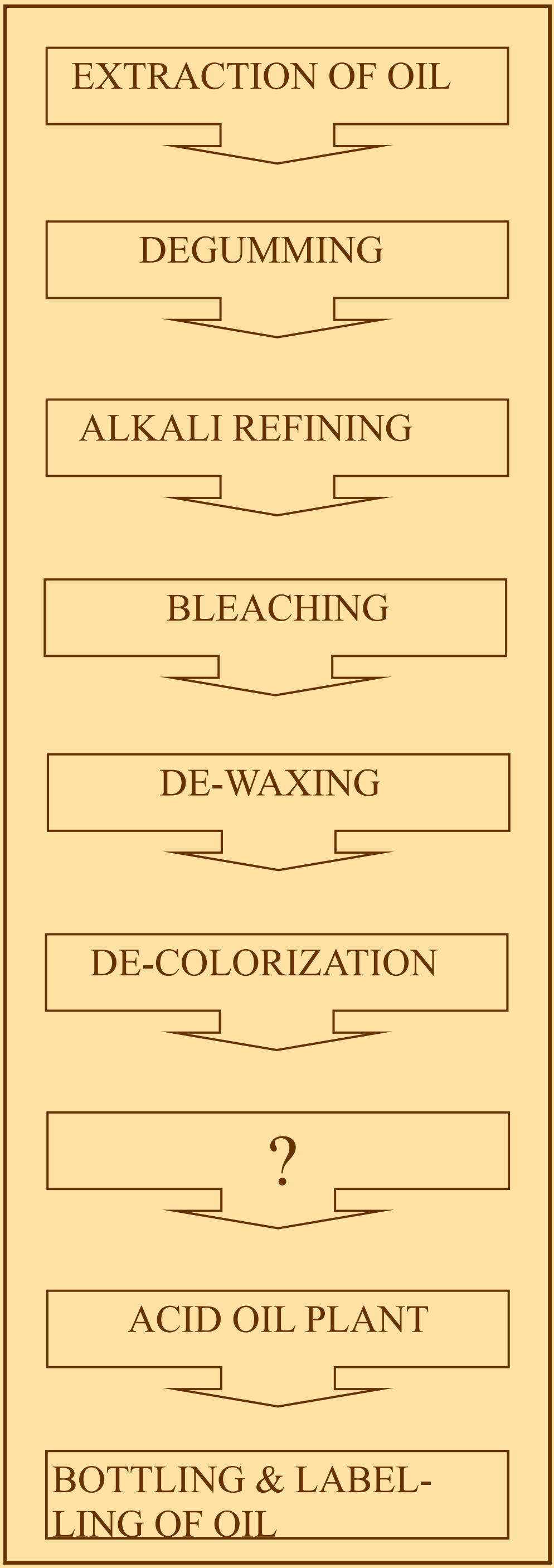
It is an optical type sensors works based on surface plasmon resonance (SPR). The term plasmonics is derived from “plasmon”, which are the quanta associated longitudinal waves propagating in matter through collective motion of large number of electrons. The electron excites from a metal due to light irradiation induces excitation of surface plasmons leading to enormous electromagnetic enhancement for ultrasensitive detection of spectral signs: **SERS and SEF.** Biosensors based on propagating surface plasmon resonance (SPRs) in films are the most well recognized plasmonic biosensors. SPR is one of the most powerful biosensing technique to evaluate biomolecular interactions. Researchers have developed magneto-optical SPR, a cantiplasmon (SPR+ cantilever technology), a lambda modulated SPR and a multiplex-SPR. The nanoscale metal structure comprised of gold or silver, give rise to the characterization and detection of analytes. The fractal-like or patterned hold nanostructures are used to detect banned fungicides like melanine, crystal violet and malachite green to ensure food quality. SERs based detection method is useful for quick screening of food samples and detection of food borne pathogens, as each bacterial species have unique fingerprint arrangement of spectral peaks. Bacillus spore can be detected by gold substrate whereas the silver is used to detect ***E.coli, L. monocytogens,*** and ***S. typhimurium***. In modern method the combination of magnetic separation with labelled silica coated magnetic nanoparticles and AuNPs labelled for multiplexed SERs detects **S*.enterica serovar typhimurium*** and ***S. aureus*** in spinach wash and peanut butter emulsion with detection limit of 10^3 CFUs/ml. Also a range of immuno and ligand binding assay to detect water soluble vitamins, chemical contaminants, drug residues like sulphonamides and beta-agonists have been developed on SPR based sensor system.

REFERENCE:nanob2a.cat/research-activities/plasmonics-biosensors.com

BHUVANA.G



FARM TO FORK



Welcome back to the **Farm to Fork** session. This session portrays the refining of edible oil. When oil comes to our mind we think of the pressing process and removing dirt alone but it has a lot of continuous process described below. As usual, one of the process is not mentioned. Try to find the missing process and this will be in the following edition.

REFINING OF OIL :

Extraction is the first step in the refining process. As the conventional method, which includes only pressing without any further processing is called cold pressing method but it is more complex .Most of the oil is extracted using a combination of pressing, heating, solvent extraction methods. After crushing the seeds ,the press exerts a pressure that squeeze out the oil . In solvent extraction, oil is removed from crushed seeds using suitable solvents. It is followed by Degumming, that removes the water in the oil using Hydratable Phosphatide and it is centrifuged to remove oil-insoluble Hydratable Phosphatide.

Next step is Alkali refining. On neutralising the crude oil with mild alkali solution removes the free fatty acids, which would react with oxygen and cause the oil to get rancid . Bleaching is done to remove colour and impurities by mixing the oil with the bleaching clay.

De-waxing is carried to get clean, clear and good refining oil. Another name for De -waxing is Winterization. Next step in refining is Deodorization. Off-odour is removed by steam distillation process which involves injection of steam into the heating oil using high vacuum. After all refining process bottling and labelling of oil is performed. The US Davis student has built a biosensor which is designed to quickly and easily evaluate the chemical profile and quality of oil is used in the industry.

Reference: www.neoda.org.uk/refining-oil, www.muezhest.com/edible-oil-refining.html&hl=en-IN , https://www.oliveoilmarket.eu/bio-sensor-machine-that-can-detect-rancid-or-fraudulent-olive-oil/

DONE BY:

KOWSIKA.N

NEW PRODUCTS :

Coca-Cola's new product Rani Float

The well known beverage maker Coca Cola is now bringing in its acquired juice brand Rani Float to India. One of the reason to bring Rani float to India is because people are now preferring juices and juice drinks more than carbonated drinks. Aujan industries first established its first beverage manufacturing plant in Dammam, Saudi Arabia and thereby introduced Rani Orange Float. the beverage is said to be inspired by a mandarin drink that the Aujan industries chairman Adel Aujan had tasted during a trip to Japan, Rani was Aujan's first homegrown beverage brand. Rani float uses real fruit pieces, also known as chunks . Rani juice has vitamin C and other things like protein and calcium. Rani was a part of Aujan industries till 2012 after which the coca-cola company and Aujan industry made partnership which resulted in the formation of Aujan coca cola beverage company. At the time of acquisition of Aujan, the US beverage maker briefed that the deal allows it to expand and its portfolio in the finance sector and drive long term partnership with the shareholders. A coca-cola India spokesperson quoted at the launch that "Rani float has real and original fruit pieces along with higher juice content, that reduces sugar and real fruit flavor." The juice and juice drinks are now taking and growing two times as that of carbonated drinks so Rani float will soon be at the top consumed beverage list.

plant based packaging soon to be launched by PepsiCo

As eco-friendly materials are in demand now-days. Food beverage major PepsiCo to launch the first ever 100% compostable, plant based packaging for Lay's and Kurkure. With increase in concern around plastic pollution have compelled FMCG (Fast Moving Consumer Goods) to rethink their packaging solutions. The president and CEO of PepsiCo India Ahmed El Sheik quoted " As a responsible leader in the food and beverage industry, our performance with a goal of achieving to design all packaging to be recoverable or recyclable, and supports increased recycling of plastic waste". And also stated that "India will be the first countries to pilot this new , sustainable packaging solution developed by PepsiCo". The l company Coca-Cola too has launched a plant based bottles in some markets. the plant bottles a fully recyclable PET (polyethylene terephthalate) plastic beverage bottle partially from plants and which looks and functions just like PET plastic bottle. it may take a while to finds its way to India. but all these products will be more gladly welcomed and loved by the people.

Frosty Boy step into India

Frosty boy has developed a range of soft service ice cream, frozen yoghurt and beverage bases to enhance their menu. Frosty Boy Australia is an internationally acclaimed food manufacturer specializing in producing high quality dessert and beverage options distributed to almost 50 countries across the world and now the frosty boy is soon going to be a part in India and is planning to make Indians go crazy for their products. Frosty boy the gold coast desert icon was launched in India following a four year campaign to get its product in the country. The company established manufacturing channels in India to sidestep the import duties up to 50 percent. Frosty boy using its manufacturing strategies has had a deal with India's largest coffee chains Cafe Coffee day and is soon going to be totally into the food industry of India. It's total amount of expenditure for this product values about US $50 billion. Cafe Coffee day will serve its milkshakes using frosty boys formulated milkshake blend. The managing director Dirk Pretorius is happy about having this deal with the Indian company since it has brought good returns to the company. According to Pretorius, the manufacturing deal was the result of intensive knowledge building to make sure the market would support the venture. Soon Frosty boy will be the top news in India and are planning to give changes accordingly to the customers and location and they have planned on making it the best product available for the customers.

INDUSTRIAL UPDATES

Tabletop Grapes to get picked by Robots in India

Mahindra &Mahindra Ltd.'s have joined with U.S. university to develop a Grape -picking robot. Research is led by Tomonari Furukawa, a professor of mechanical engineering at Virginia Tech. India is the second largest producer of tabletop grapes , which is grown for eating purpose. Picking tabletop grapes is intensive work. Ensuring the quality is also critical because each person who harvest the grapes have different visual criteria for harvesting. So, " That brings up the idea of robotic harvesting , which replaces the human harvesters," Furukawa said. They are using advanced robotic vision to identify grapes in a three-dimensional environment using state of the robotic vision. The Project focuses on harvesting grapes gently and efficiently with the use of dual robotic arms and machine learning technology .Both Furukawa and Jejurikar, President of the Farm equipment sector said the work being done with these robots will open up more possibilities not only in India but also throughout the world.

https: / /www. roboticsbusinessreview.com/agriculture/tabletop-grapes picked-robots-india-virginia -tech.

Nestle offers Food Safety Institutes to FSSAI

After a bitter battle with the Food Safety & Standards Authority of India (FSSAI) following the ban on its Maggi noodles, Nestle has proposed to collaborate with the national food regulator on the same contentious issue of food safety that had led to the ban. According to Nestle Chairman Suresh Narayanan, the company has "made an offer to the FSSAI chairman and CEO to set up food safety institutes and disseminate good practises on food safety. They will be coming out with number and structure. Their response to our proposal has been very positive," he said. He added that collaborating with the Indian government on subjects such as food safety is something that Nestle headquarters at Switzerland was also keen on. While the FSSAI had banned Maggi in June last year on allegations of higher than permissible lead content and flavour enhancer monosodium glutamate, seven countries including the US had cleared its samples. The Bombay High Court overturned the ban in August last year and after clearing multiple tests, Maggi was back on stores last November. "What happened, has happened. I don't think we are going to be obliterated with the memory of what happened for all times to come," Narayanan said.

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McD to convert cooking oil to biodiesel

Hardcastle Restaurants, the master franchisee for McDonald's in the western and southern markets, is planning to recycle the used cooking oil and convert it into biodiesel for powering its refrigerated supply delivery trucks, a top company official said today. The company is currently piloting the project here, and is also looking at Bengaluru. "We will soon bring all our 277 outlets under the recycling programme," Vikram Ogale, director, supply chain and quality assurance, Hardcastle Restaurants (HRPL). The company started the pilot last year, with Unicon Biofuels, and has so far scaled it up to cover 85 restaurants in the city, converting over 35,000 litres every month into biodiesel, he said. Ogale claimed the biodiesel made from the used cooking oil to be a cleaner fuel with 75 per cent lower carbon emissions than diesel over its entire life cycle.

https://www.foodnbeveragesprocessing.com/2018/08/08/mcd-to-convert-cooking-oil-to-biodiesel/

BANG THE MYTH

Dear Readers, Not every myth has to be true. The fact is that these additives and chemicals play an important role in keeping the freshness, safety, taste, colour and texture of the food. The other fact is that these additives are included in food processing for some special reasons whether they are to guarantee their safety, to improve their nutritional value or to increase their organoleptic characters such as taste and appearance. Additives such as anti-oxidants stop oil from getting changed into rancid and additive like emulsifiers restricts peanut butter from getting divided into solid and liquid parts. Food additives that are approved and permitted by authorities are used in food processing industry and a regulatory committee keeps a strict vigil on the amount and the types of those additives. It is also a rule in food processing industry throughout the world to list every ingredient used in processing of that particular food item.

READER'S COLUMN:

This edition articulates the role of biosensors in detecting the deteriorated food by minimising the testing hours. It includes POC (point of care) ,biodegradable, plasmonic biosensors. It also delineates the new green alternative packaging – Oxo biodegradable plastics . Organic colouring agent is discussed in this edition. New regulation for fortification of edible oil is also expounded. For readers' satisfaction, more interesting topic is included.

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