



SciTech in Brief

Information Services Centre, No. 363, Bauddhaloka Mw., Colombo 07

Science Quote

Science is facts; just as houses are made of stone, so is science made of facts; but a pile of stones is not a house, and a collection of facts is not necessarily science.

Jules Henri Poincaré

USING SILICA NANOPARTICLES FOR DRUG DELIVERY TO THE SKIN

Researchers from the University of South Australia's Ian Wark Research Institute (the Wark) have invented and patented a new technology for delivering cosmetics and drugs to the skin.

They are using nanoparticles of silica (essentially sand) to create longer-lasting cosmetics and creams that control the delivery of drugs through the skin.

They already have a family of international patents on their technology and are now actively looking for commercial partners to get their invention out of the lab and on to your skin.

Many liquids are taken for granted - milk, paint, salad dressings and skin creams, are actually emulsions, tiny droplets of oily compounds dispersed in water and are typically created using surfactants or detergents. Wark scientists have de-

veloped emulsions in which silica nanoparticles -miniscule grains of sand-coat the oil droplets instead.

Coating the tiny emulsion droplets with silica increases the stability of the mixture and makes it less likely that the active compounds inside will degrade or be released until it is time to happen

Using the method, found that, from a clinical point of view, drug delivery can be improved by adjusting release through the thickness of the coating. Hence both fast-release, and slow or controlled-release delivery systems can be prepared.

This could be really beneficial if a drug has to be released at a specific time, or if releasing too much at once can lead to accumulation and toxic effects.

It turns out that silica nanoparticles interact with skin cells in a way which increases the delivery of drugs to specific

skin layers significantly.

Using the nanoparticles, not only was a higher concentration of the active ingredient delivered, but also leakage into the blood stream was limited. This is a great advantage for skin creams such as sunscreens, for instance. It limits exposure of the rest of the body, and any consequent toxicity.

Nanoparticle-coated emulsions are cost-effective because they are efficient at delivering drugs. A smaller quantity of active compound can be used in a more stable form.

Wark researchers also found that the nanoparticles did not pass through pig skin and in the near future will be trialing using human skin."

Source : Focus No. 163 August (2010) p.28

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CNI LAUNCHES SOLUTION FOR FIBRE-ENRICHED BEVERAGES

Acacia gum supplier, CNI (Colloides Naturels International), has launched Fibregum Clear, a highly purified and clarified version of Fibregum, especially developed for the fibre enrichment of beverages. Fibregum Clear is obtained through a very specific purification process and offers exactly the same benefits as conventional Fibregum, for functional beverage applications.

Fibregum is an all-natural acacia gum particularly rich in soluble fiber (minimum 90%). Fibregum offers exceptional, scientifically proven nutritional properties, including a strong prebiotic effect. Fibregum helps balance the intestinal micro flora and favors the growth of "good" bacteria (bifidobacteria, lactobacilli). The fermentation of Fibregum also induces the production of short chain fatty acids (SCFA), the potential health benefits of which are well known.

Fibregum is very well tolerated, compared to other sources of soluble fibers: it does not cause any intestinal discomfort when consumed at levels below 50g/day.

Fibregum Clear's low viscosity and excellent stability in acidic medium make it an ideal choice to improve the nutritional profile of functional beverages and juices with no impact on their clarity, brightness and flavor

Fibregum Clear is an all-natural source of soluble fiber, and its addition in functional beverages permits claims such as "enriched with fiber" or "good source of fibre".

Source : The World of Food Ingredients 10, March, (2010) p. 22

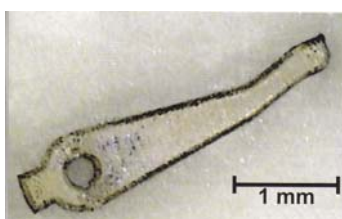
TINIEST PARTS, GREATEST BENEFIT

Microsystem technology : How engineers are seeking new ways of making components

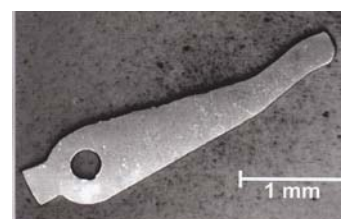
High-tech in the tiniest of spaces: In microtechnology, bodies and structures that are in just micrometres in size are made and assembled. When such minute components are also equipped with mechanical, optical or chemical functionality, experts refer to this as microsystem technology.

The components used in microsystem technology are minute in size yet highly functional. Electronic functions, for instance, generally require the use of metallic materials in the components. Ceramics are useful due to their great hardness and heat resistance, and polymers are used due to their tailorable properties and ease of processing. Polymers are also needed if the components are to come into contact with substances that they are not meant to react with, for example in order to avoid changing their chemical composition. These properties are often desirable or even essential for products used in medical technology.

Source : German Research 2/2010 p. 25-27



The micromould used for the metal-capillary pressure casting process.



The finished cast gripping arm.

ICE CREAM WITH IMPROVED MOUTH FEEL

Ice cream is a complex multiphase system consisting of ice crystals, air cells, protein and fat globules embedded in a frozen high viscous and concentrated matrix. The microstructure of these constituents has significant impact on the consumer quality characteristics.

The process for conventionally frozen and hardened ice cream is :

1. Mixing
2. Pasteurisation
3. Homogenisation
4. Cooling to below 5 °C and then ageing
5. Freezing to -5 °C and incorporation of air
6. Filling or packing
7. Hardening to -18 °C
8. Storage and distribution at -30 °C



One of the most important steps in ice cream production is the freezing step where the ice cream mix changes from a liquid oil-in-water emulsion to a frozen state. Many of the emulsion drops are destroyed and the fat agglomerates. Air is incorporated and dispersed in the ice cream (up to 50% of the ice cream is air). If the water and ice crystals are not bound efficiently by agglomerated fat, large ice crystals will be formed and the quality of the ice cream will decrease during temperature fluctuations. The quality of ice cream can be significantly improved by implementing further cooling after the freezing step. Low temperature extrusion is used for this process, where the ice cream is cooled down further from -5 °C to -15 °C by using an ice extruder technology known as the Kombinator X250 from Gerstenberg Schroder.

The mechanical treatment at very low temperatures in the Kombinator X250 has a large impact on the microstructure and characteristics of the ice cream resulting in improved quality.

The quality of the ice cream can be evaluated by melt down tests which will show how the fat has crystallized and agglomerated. If the ice cream consists of a higher ratio of fat globules below 20 micron the melted ice cream will maintain its shape for a longer time.

Customer tests have confirmed that ice cream produced by low temperature extrusion using the Kombinator X250 show improved quality characteristics. The low temperature extrusion technology results in the following benefits.

- Creamier, less icy product
- Optimised reduced fat products due to improved creaminess
- Shorter and smaller hardening facilities
- Energy saving
- Longer shelf life due to smaller ice crystals

Source : Danish Dairy & food industry 20 September 2010 p. 24-25

BEER WASTE GAS TO FEED GRID

Methane produced from brewery waste will be fed into the UK's national grid from the first anaerobic digestion plant of its kind in the country.

The brewery Adnams worked with British Gas to build the 4.8 MW anaerobic digestion plant, which will process waste from the brewery as well as local food waste. Unlike most other anaerobic digestion units, the gas produced in this plant meets the National Grid's requirements for injection into the UK's mains gas network. The gas can also be used as a vehicle fuel.

The Adnams Bio Energy plant consist of three digesters, which break down up to 12,500 t/y of organic waste and produce biomethane and a liquid organic fertiliser. The facility is expected to start up later this summer. Around 40% of the gas will be used to run the brewery and its fleet of lorries, the rest will be injected into the grid.

National Grid estimates that the UK could produce enough biomethane from organic waste to cover 15% of the domestic demand for natural gas.

Adnams has futher plans to increase the sustainability of its operations. The company aims to install solar water heating and photovoltaic cells to allow its brewery and distribution centre to run entirely on renewable.

Source : *tce* – *The Chemical Engineer* No. (831) September, 2010 p. 14

FROM BIODIESEL TO BIODEGRADABLE PLASTICS

In a major discovery, the Bhavnagar-based Central Salt and Marine Chemicals Research Institute (CSMCRI) has found a microbe useful in the manufacture of biodegradable plastic from a side-stream product of jatropha called 'glycerol', which is found during extracting biodiesel from the plant seeds. The Institute is all set to scale up its commercial production. Surely, it is a revolutionary advancement that is poised to tackle the challenge of ever-increasing environmental pollution posed by non-degradable plastics.

As part of the Budapest Treaty on international recognition of deposit of microorganisms for patent procedure, the identified microbe has been deposited by CSMCRI with a repository.

Source : *CSIR News Vol 60 Nos (7&8) 2010 p. 75*

Make a difference

Paper does grow on trees:900 million of them every year become pulp and paper. Recycled paper uses 60% less energy than virgin paper. Each ton of recycled paper saves 4400 kW-h of energy, 30000 liters of water and 19 trees and a tree has the capacity to filter up to 27 kg of pollutants from the air.

Encourage paper recycling.

Use recycled paper.

Time April 9th, 2007

Image: actualizers.blogspot.com

DIESEL FROM SUNLIGHT AND CO₂

US-based alternative energy technology company Joule Unlimited has successfully patented a direct, single-step process to convert sunlight and waste CO₂ into liquid hydrocarbons, which can then be turned into diesel using microorganisms.

The microorganisms act as biocatalysts that convert sunlight, waste CO₂ and non fresh water into the diesel range of hydrocarbons. These are chemically different from biodiesel and can be used in existing vehicles, without the need for expensive conversions.

Source : tce – The Chemical Engineer, No.832 October 2010 p. 20

SPRAY YOURSELF DRESSED

Collaboration between a fashion designer and Imperial College London has led to the development of a fabric that can be sprayed onto the skin.

The spray-on fabric is produced from short fibres that are bound together with polymers. A solvent is used to deliver the fabric in liquid form, using an aerosol can or a high-pressure spray gun.

When the spray reaches the surface the solvent instantly evaporates, to make clothes that can be washed and re-warn.

Source: tce – The Chemical Engineer , No. 832 October 2010 p.20

New Additions

All About Foods
Dr. K.K.D.S. Ranaweera

Godage International Publishers (Pvt) Ltd.
Sri Lanka

Accession No. 39944

Selected Formulary Book on
Inks, Paints, Lacquers, Varnishes and Enamels

NIIR Project Consultancy Services
Delhi

Accession No. 39958

Trease and Evans
Pharmacognosy

Elsevier

Accession No. 39956

Fundamentals of Quality
Control and Improvement

PHI Learning Pvt Ltd.
India

Accession No. 39972

Mathematical Statistics with
Applications

Pearson Education
Singapore

Accession No. 39971

Plant and Animal Physiology

Cengage Learning India Pvt
Ltd.

Accession No. 39939

READING THE WEATHER

Learning from climate history: Temperature fluctuations and greenhouse-gas concentrations have been recorded for centuries. Researchers in Potsdam are using measurements from the past to optimize future scenarios for global warming.

Climate researchers have, particularly in recent years, made intense efforts to more accurately determine the sensitivity of the climate system to changes in the concentration of greenhouse gases. Through advances in computing power, it has become possible to run large sets of various climate model version (up to several thousand simulations per model). This process involves systematically changing the still-uncertain parameter values for a given climate model (e.g., the parameters used in calculating the optical properties of clouds).

In this way, a large number of different model versions with varying sensitivity are generated—for example, some models in which the clouds respond strongly to a change in global temperature and have a large climate sensitivity value, but also models with a considerably smaller sensitivity, with which clouds exhibit relativity, small changes.

The key question remains: which of these models is best suited for explaining temperature history? A look back into the thousands of years of the earth's history is revealing. A range of different climate archives now facilitate the reconstruction of past climate changes.

Source : German Research 2/2010 p. 14-18

EMERGENCY WARNING BROADCAST EARLY WARNING FOR SECURITY AND SAFETY

NHK provides two types of emergency broadcasts: Emergency Warning Broadcasting (EWB) system and Earthquake Early Warning (EEW) system. In addition to an activation signal for receivers, the EWB system consists of information about the expected major Tokai earthquake and tsunamis. It can also include information from local municipal authorities. The EEW systems contains information from the Japan Meteorological Agency on the estimated scale and seismic center of an earthquake, and it is possible to send this warning before large tremors (S-wave) strikes by measuring small tremors , (P-wave) that come immediately before it. At times the broadcast does not reach people near the seismic center in time, and there are technical limitations, such as a seismic scale estimation error. However, it is believed that the damage from an earthquake can be reduced by using the small window of time available before the large tremors strikes.

NHK automatically broadcasts EEW sent from the Japan Meteorological Agency during its programming. And people who are watching TV at the time can receive emergency information on the earthquake. Thus developing a way to activate TV receivers automatically when an EEW is released.

Source : NHK STRL Bulletin : Broadcast Technology -Summer 2010 p.21

EVENTS

International Symposium on Organic Matter Management & Compost Use in Horticulture

4th to 7th Apr 2011

Adelaide, Australia (AUS)

This International Scientific Symposium will focus on:

- Characterization and production of fit-for-purpose organic soil amendments and growing media,
- Potential uses for compost products as horticultural soil amendments and mulch,
- Managing organic matter in conventional, integrated and organic horticultural production systems,
- Identifying and quantifying the agronomic, environmental and societal benefits of using composted and un-composted organic soil amendments and mulches,

More Info : <http://compost-for-horticulture.com/>

11th INTERNATIONAL CONGRESS ON ENGINEERING AND FOOD

11th ICEF 2011; May 22-26, 2011;

ATHENS - GREECE

“Food Process Engineering in a Changing World”

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2011 International Conference on Environmental Science and Development ICESD 2011

7th to 9th January 2011

Mumbai, India

Website: <http://www.icesd.org/>

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