

## Sugar Kills

### Household pests like termites, cockroaches

Household pests like termites, cockroaches and ants can now be controlled using a sugar-derivative. Pesticides that are usually used to control these insects can harm more living beings-including humans-than they are meant to. The molecule was used on the termite; it reduced the immunity of the insect and made it more vulnerable to infection from natural pathogens. Simple pathogens like fungus and bacteria are present in abundance in the nest of a termite. The termite resists such pathogens using a special protein that attacks the cell of the invading pathogen and kills it. Mark S Bulmer, molecular ecologist from the Northeast University, Boston, and collaborators at Massachusetts Institute of Technology, found that the sugar-derivative-D-delta-gluconolactone (GDL)-blocks the protein and lowers the insect's resilience to infection.



The team fed termites filter paper treated with GDL and exposed them to a fungal pathogen. Termites died within five days which was half the time taken by ones not fed on GDL. "We are currently engineering micro-capsules to encase the sugar molecule. These capsules can be made of natural materials (like cellulose) that only termites have the enzymes to break down," said Ram Sasisekharan of MIT who headed the study. "The micro-capsules can be used as green pesticides. They could be mixed in paints or added to home-building materials and renewed as needed to ensure long-term protection from pests," he added.

Further research is needed to test the efficacy of the molecule in fields as it is biodegradable and might not last long enough in the nests. How this molecule will be introduced in the ecosystem is still not known. As the immunity protein is common to all insects the method can be used for other pests like cockroaches but it is time-consuming and expensive, said Traniello. The study was published online in the June 8 issue of the processing of the National Academy of Scientists. **Source:** Science And Environment Fortnightly, Down To Earth- July 16-31, 2009

## Soon, e-data that self-destructs

A group of computer scientists at the University of Washington has developed a way to make electronic messages “self destruct” after a certain period of time, like messages in sand lost to the surf.

The researchers said they think the new software, called Vanish, which requires encrypting messages, will be needed, more and more as personal and business information is stored not on personal computers, but on centralized machines, or servers.



The idea of developing technology to make digital data disappear after a specific period of time is not new. A number of services that perform this function exist on the World Wide Web, and some electronic devices like FLASH memory chips have added this capability for protecting stored data by automatically erasing it after a specified period of time. This is called cloud computing, and the cloud consists of the data-including email and documents-stored on numerous servers.

But the researchers said they had struck upon a unique approach that relies on “shattering” an encryption key that is held by neither party in an email exchange but is widely scattered across a peer-to-peer file sharing system.

Public key cryptography makes it possible for two parties who have never physically met to share a digital secret and as a result engage in a secure electronic conversation sheltered from potential eavesdroppers. The technology is at the heart of most modern electronic commerce systems.

Vanish uses a key-based encryption system in a different way, making it possible for a decrypted message to be automatically re-encrypted at a specified point in the future without fear that a third party will be able to gain access to the key needed to read the message.

The pieces of the key, small numbers, tend to “erode” over time as they gradually fall out of use. To make keys erode, or timeout, Vanish takes advantage of the structure of a peer-to-peer file system.

Such networks are based on millions of personal computers whose internet addresses change as they come and go from the network. This would make it exceedingly difficult for an eavesdropper or spy to reassemble the pieces of the key because the key is never held in a single location.

The vanish technology is applicable to more than just email.

**Source:** The Times of India

## Orange Juice-Shelf-Life may be extended by natural chitosan

A new study claimed that using *chitosan* may act as an anti-microbial ingredient for orange juice, and remove the need for pasteurization. *Chitosan* is an emerging ingredient extracted from fungi cell walls.

Adding one gram of *chitosan* to one litre of fresh orange juice was found to reduce both enzymatic and non-enzymatic browning of the juice, while also controlling the spoilage during the storage time.

The research taps into an ever-growing body of study exploring novel source of natural alternatives to synthetic preservatives, such as BHA and butylhydroxytoluene (BTH), to slow down the oxidative deterioration of food is gaining interest.

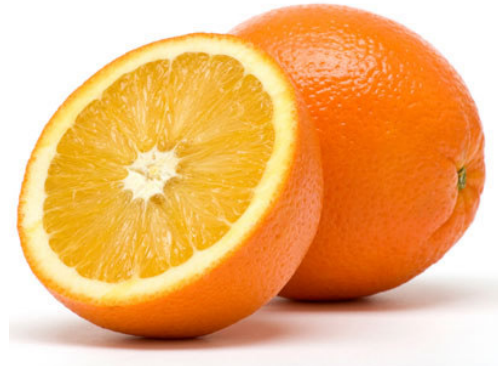
The study also provides an alternative approach to pasteurization, said the researchers, following concerns raised by the US Food and Drug Administration (FDA) to avoid consumption of un-pasteurised orange juice due to fears of potential contamination with *Salmonella Typhimurium*.

The researchers, led by Ana Martn-Diana from the Postharvest Technology Unit (PTU) and Functional Ingredient Food Unit (FiFu) at the Dublin Institute of Technology (DIT), enriched orange juice with chitosan in concentrations ranging from 0 to 2 grams per litre of juice.

Addition of chitosan, produced by the deacetylation of chitin - a natural non-digestible polysaccharide found in the cell walls of fungi and the exoskeletons of insects - was found to reduce the counts of bacteria, and reduced the browning of the juice.

However, while chitosan concentrations over 1 gram per litre favourable impacted the quality, they adversely affected the vitamin C content of the juice, as well as increased the bitterness of the juice, said the researchers.

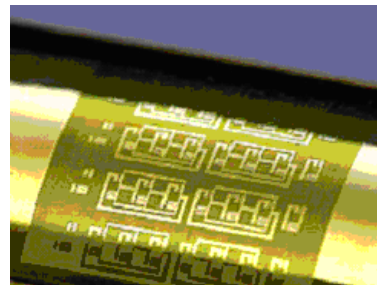
The researchers noted that additional study is required, and should include investigating how the deacetylation degree of chitosan affected the degree of preservation of the juice. Additional microbiological studies should also help an emerging ingredient extracted from fungi walls.



**Source:** Processed Food Industry, Vol. 12 No. 8, June 2009

## Flexible Circuits

Flexible electronics (also known as flex circuits or flex circuit boards) is a technology for assembling electronic circuits by mounting electronic devices on flexible high-performance plastic substrates, such as polyimide. Circuits can be designed in configurations from simple, single-sided conductive paths to complex high density three-dimensional assemblies utilizing a variety of fabrication materials from low cost polyester to mid range PEN to high density adhesiveless polyimide Novaclad. Additionally, flex circuits can be screen printed silver circuits on polyester. Flexible electronic assemblies may be manufactured using identical components used for rigid printed circuit boards, allowing the board to conform to a desired shape, or to flex during its use.



**Developments:** The original recipe for flexible CMOS circuits comprised a 2- to 3-micrometer circuit layer sitting atop a plastic substrate as much as 100  $\mu\text{m}$  thick. But the new version has a total thickness of only 1.7  $\mu\text{m}$ , including the plastic, which gives it the ability to wrap around a rod whose diameter is roughly 85  $\mu\text{m}$ . In LCD fabrication, glass is used as a substrate. If thin flexible plastic or metal foil is used as the substrate instead, the entire system can be flexible, as the film deposited on top of the substrate is usually very thin, on the order of a few micrometres. OLEDs are normally used instead of a back-light for flexible displays, making a flexible organic light-emitting diode display. Flexible solar cells have been developed for powering satellites. These cells are lightweight, can be rolled up for launch, and are easily deployable, making them a good match for the application.

Researchers at the University of Illinois at Urbana-Champaign (USA) make plastic circuits by transferring thin ribbons of silicon onto glue-coated plastic using a patterned rubber stamp. But before the ultrathin silicon layer is applied to the substrate, the plastic is heated, causing it to expand. Once the circuit layer is deposited and chemically bonded to the expanded substrate, the plastic is allowed to cool and contract. Relaxing the strain causes the circuit layer to buckle and form wavy patterns like the bellows of an accordion. It's the folds and wrinkles that give the circuit the ability to stretch and bend without breaking. Researchers say that in laboratory tests, the circuits, after a few hundred stretch-and-release cycles, showed no signs of fatigue.

**Applications:** Flex circuits are often used as connectors in various applications where flexibility, space savings, or production constraints limit the serviceability of rigid circuit boards or hand wiring. In addition to cameras, a common application of flex circuits is in computer keyboard manufacturing; most keyboards made today use flex circuits for the switch matrix.



**Dr.S S Verma**

Department of Physics, S.L.I.E.T. (Deemed to be University) Longowal, Distt.-Sangrur (Punjab)-148 106

**Email-**ssverma@fastmail.fm

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