The effect of incorporation of emulsified oil with yolk on the strength of gel network systems, produced by heating of egg yolk or egg white dispersions, was investigated by researchers at Laboratory of Food Chemistry and Technology, School of Chemistry, Aristotle University of Thessaloniki, Thessaloniki, Greece. The yolk gels exhibited a decrease in their mechanical strength as a result of oil incorporation. The white-based gels, on the other hand, showed a higher strength, following incorporation of oil droplets, the result depending on the droplet size but more on oil levels. The interaction between the globular proteins of egg white and the lipoprotein-covered oil droplet surfaces was established by applying SDS-PAGE electrophoresis. The results were discussed in terms of the differences in structure between the yolk and the white proteins that may affect the way they denature and interact following heating [Kalkani A, Paraskevopoulou A and Kiosseoglou V, Protein interactions and filler effects in heat-set gels based on egg, Food Hydrocol, 2007, 21 (2), 191-197].
Detecting the integrity of aseptic paperboard laminate packages containing aluminium foil

The aseptic paperboard package is an important packaging type in the food industry, especially for milk and beverages products. The most important function of an aseptic package is to protect the sterilized product against microbial contamination during storage. Among the factors leading to the deterioration of the packaged products, pinholes caused by faulty heat sealing and/or machinery piercing are the most important ones which may lead to contamination of the product by microorganisms. In statistical quality control, a package with micro-holes is considered a critical defect which may lead to penetration of microorganisms into the package. However, microorganisms cannot penetrate through the aluminium layer, the only problem is the interaction between the product and the exposed aluminium. Hence, techniques for detecting pinholes are required by producers of aseptically packaged products. Therefore, researchers at Department of Food Science, Yuanpei Institute of Science and Technology, Hsinchu, Taiwan developed a method to determine the integrity of aseptic paperboard laminate packages containing aluminium foil using the cyclic voltammetric method. The ability of the method to identify pinholes arising from cracks in the plastic inner layer was demonstrated. When a cyclic voltammetric (CV) method was applied, a peak current was observed at the voltage greater than 0.6 V arose due to the chemical reaction at the exposed aluminium layer. Moreover, in packages with penetrating pinholes, the pinholes formed an ion channel which allowed ions to flow out of the package. The study demonstrated that CV method is applicable to distinguish between the defects of aseptic paperboard laminate packages containing aluminium foil [Hsu Chuan-Liang and Chang Ku-Shang, Development of a novel method for detecting the integrity of aseptic paperboard laminate packages containing aluminium foil, Food Control, 2007, 18 (2), 102-107].

Water barrier properties of treated-papers and application to sponge cake storage

Paper is widely used in food packaging applications and is generally more appreciated by consumers than plastic films because of its characteristics of recyclability and biodegradation. Water barrier properties of three treated papers and of one plastic film were compared and the potential of these packaging films to prevent moisture loss from a sponge cake during storage in standard conditions (25°C and 50% relative humidity gradient) was evaluated by scientists at France. A transparent heat sealable coextruded biaxially Oriented PolyPropylene film (biOPP) was used as a reference in the study. Three papers treated with substances other than polyolefins were studied. Paper “1” is a paper which was impregnated (bulk treatment to fillup pores) with a hydrophobic substance (acrylic-based latex 1) on both sides then supercalendered. Paper “2” is paper 1 which was then coated (surface treatment) with the same weight of another hydrophobic substance (acrylic-based latex 2) on both sides. This treatment provides a water vapour barrier and a dense surface to this paper. Paper “3” is a paper which was impregnated (PolyVinyl Alcohol treatment) then calendered and coated on both sides in the same way as paper “2”, which also provides a water vapour barrier and a dense surface to this paper.

Sorption isotherms were established at 25°C for both sponge cake and papers, from which diffusivity values in papers were determined for the whole range of A_w. Permeability of packaging films was determined in standard conditions. Water sorption was close for all papers, regardless of their treatment, whereas water diffusivity was reduced by coating or calendering. Water vapour permeability in papers was controlled by diffusivity which was characterized by a two-phases (vapour then bulk water state) mechanism. Calendered-coated papers and plastic film were both adapted to prevent moisture loss from intermediate moisture foods such as a sponge cake during usual storage time [Dury-Brun C, Jury V, Guillard V, Desobry S, Voilley A and Chalier P, Water barrier properties of treated-papers and application to sponge cake storage, Food Res Int, 2006, 39 (9), 1002-1011].
Pulp from oil palm fronds

To enhance the use of the abundant biomass generated by the palm oil industry in Malaysia, a study was conducted by researchers in view of exploring the paper making potential of this industrial by-product. Fibre strands from the frond of oil palm (Elaeis guineensis Jacq.) trees were examined relative to their physical and chemical characteristics and their response to chemical pulping such as sulfite, soda-sulfite and soda processes. Morphologically, the frond fibres are comparable to those of hardwood. They contain high content of holocellulose but low in lignin. Chemical pulps of 45-50% yield produced either by soda-sulfite or soda process exhibit acceptable paper making properties comparable to those of hardwood kraft pulps. The study showed that frond pulp might be used as a reinforcement component in newsprint production using softwood thermo-mechanical fibres [Wanrosli WD, Zainuddin Z, Law KN and Asro R, Pulp from oil palm fronds by chemical processes, Ind Crops Prod, 2007, 25(1), 89-94].

Paper pulp delignification using laccase and natural mediators

Three plant phenols, namely acetosyringone, syringaldehyde and p-coumaric acid, were selected as laccase redox mediators by researchers at Spain to investigate the enzymatic delignification of paper pulp obtained from kraft cooking of eucalyptus wood, (Eucalyptus globulus Labill.) in combination with peroxide bleaching. The effects of these natural mediators were compared with those obtained using the synthetic mediator 1-hydroxybenzotriazole. p-Coumaric acid only caused minor increase of pulp brightness and did not lower its kappa number (a rough estimation of the lignin content), whereas, the use of acetosyringone or syringaldehyde as laccase mediators enabled over 15% increase of final brightness and a similar decrease of final kappa number. Pulp delignification by laccase in the presence of the two latter natural mediators was demonstrated by analytical pyrolysis, which does not suffer from interferences by other pulp constituents as kappa number does, showing a preferential removal of lignin marker compounds compared with carbohydrate markers (up to 25% decrease of the corresponding ratio). This technique also revealed a modification of the residual lignin composition in terms of phenylpropane units after the laccase-mediator treatment. This study initiates a promising research area in environment friendly bleaching of paper pulps based on the use of some natural phenols, which are widely available at the paper pulp industry, as mediators for laccase delignification of pulp [Camarero Susana, Ibarra David, Martínez Ángel T, Romero Javier, Gutiérrez Ana and del Río José C, Paper pulp delignification using laccase and natural mediators, Enzyme Microb Technol, 2007, 40(5), 1264-1271].

Eucalyptus globulus twig
Freshwater algal biomass and citrus peels as tissue paper pulp supplement

In view of the shortage of conventional raw materials for pulping and the increasing demand for paper products, new raw materials for pulp production such as non-wood fibres are being investigated worldwide. Freshwater algal biomass and orange (Citrus sinensis Linn. cv. ‘Valencia’) and lemon (Citrus limon Linn. cv. ‘Meyer’) peels were assessed as tissue paper pulp supplements by scientists at Greece. Cellulose and hemicellulose contents of algal biomass were 7.1 and 16.3%, respectively, whereas for citrus peels cellulose content ranged from 12.7 to 13.6% and hemicellulose from 5.3 to 6.1%. For all materials, lignin and ash content was 2% or lower, rendering them suitable for use as paper pulp supplements. The addition of algal biomass to paper pulp increased its mechanical strength significantly. However, brightness was adversely affected by chlorophyll. The addition of citrus peels in paper pulp had no effect on breaking length, increased bursting strength and decreased tearing resistance. Brightness was negatively affected at proportions of 10%, because citrus peel particles behave as coloured pigments. The cost of both materials is about 45% lower than that of virgin conventional pulp, so a 0.9-4.5% reduction in final paper price could be achieved by using them as supplements (at 2.5-10% proportions) in tissue paper manufacture [Ververis C, Georghiou K, Danielidis D, Hatzinikolaou DG, Santas P, Santas R and Corletti V. Cellulose, hemicelluloses, lignin and ash content of some organic materials and their suitability for use as paper pulp supplements, Bioresour Technol, 2007, 98(2), 296-301].

Spices

Fruit size and stage of ripeness affect post-harvest water loss in bell pepper fruit

Fruit water loss accounts for most of the weight loss in the majority of horticultural produce. Temperature and humidity are the environmental factors that have the strongest influence on fruit quality. Bell pepper (Capsicum annuum Linn.) fruit quality and post-harvest life are highly determined by fruit water loss or transpiration. The surface of pepper fruit lack stomata and thus gas diffusion is primarily through the cuticle of the skin and the contribution of the calyx to whole-fruit transpiration is not known. Permeance of a plant organ to a gas is the rate at which the gas can diffuse in or out of the organ per unit surface area for a given gradient of partial pressure of the gas. Permeance is also known as conductance and represents the reciprocal of resistance to gas diffusion. The scientists at Department of Horticulture, Tifton Campus, University of Georgia, Tifton, USA did study to determine the changes in transpiration and permeance to water vapour of bell pepper fruit as affected by fruit stage of development, ripeness and storage.

The results revealed that fruit diameter was correlated with fresh weight and surface area was associated with fresh weight and diameter. Fruit surface area decreased logarithmically with increases in fruit size, with smaller fruit showing larger changes in surface area than larger fruit. Mean water loss rate for individual fruit and permeance to water vapour declined with increases in fruit size and as fruit ripeness progressed. Fruit surface area/fresh weight ratio and rate of water loss were both highest in immature fruit and showed no differences between mature green and red fruit. In mature fruit, permeance to water vapour for the skin and calyx were 29 µmol m⁻² s⁻¹ kPa⁻¹ and 398 µmol m⁻² s⁻¹ kPa⁻¹, respectively. About 26% of the water loss in mature fruit occurred through the calyx. There was a decline in firmness, water loss rate and