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PACKAGING SCIENCE

E' la Rassegna Scientifica Internazionale della Fondazione Carta Etica del Packaging.

Pubblicazione bimestrale in cui sono presentati 7 articoli multidisciplinari, afferenti al packaging, selezionati da diverse riviste del mondo scientifico digitale.

*Packaging Science attraverso le tematiche sempre attuali ed aggiornate dei suoi articoli in diverse discipline, concorre ampiamente alla promozione e all'evoluzione della corretta cultura del packaging e dei **10 Valori della Carta Etica** per accompagnare il packaging verso un futuro più consapevole.*

USA: il Packaging alimentare alleato dei Mastri Birrai contro il Covid

Negli USA l'anno 2020 è stato caratterizzato dalle sfide affrontate dall'industria della birra. La vendita di bevande confezionate anche in lattine di alluminio ha permesso ad alcuni birrifici di rimanere aperti. Questo articolo mira a esaminare molte sfide e soluzioni di confezionamento fornite all'industria della birra durante la pandemia.



Communication

Brewery Packaging in a Post-COVID Economy within the United States

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Abstract: The 2020 pandemic caused by the novel coronavirus, SARS-CoV-2, also referred to as the COVID-19 [named for the disease caused by the virus] pandemic, shook the world to its core. Not only were populations hurt by the virus physically, the pandemic had deep repercussions economically as well. One of the industries severely impacted by the implications of the 2020 COVID-19 pandemic was the brewing industry, particularly that of the United States. The economic turmoil and uncertainty were felt by both macro and micro brewers alike. Draft beer sales virtually dried up overnight as state-imposed shutdowns closed bars, restaurants, and taprooms as a means to curb the spread of the virus. There were supply chain and logistical issues that arose during the pandemic due to not only closures within the brewing industry but supporting industries such as printers and shippers. In some cases, entire business models had to be turned completely on their head in an instant and business pivots had to be made. The year 2020 was wrought with challenges faced by the brewing industry. There was one saving grace however that kept many breweries afloat during the pandemic, and that was packaged beverage sales, especially those packages intended for off-site consumption. Set forth by trends of the pre-pandemic years aluminum cans and canning reigned supreme for the craft brewing market and allowed breweries to get product into the hands of consumers and ultimately allowed some breweries to stay open. Other options breweries had included the use of glass growlers or aluminum crowlers as a means to sell draft products to-go. The resourcefulness of many brewery owners was tested in 2020 and many rose to the challenge. This report aims to examine several of the challenges, pivots, and solutions packaging provided to the beer industry during the pandemic.



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Le nanoparticelle innestate di polimeri - polymer-grafted nanoparticles (PGN)

La superficie piatta è la più adesiva e la superficie concava è la superficie meno adesiva. Questa scoperta alquanto controintuitiva suggerisce che mentre una nanoparticella nuda ha maggiori probabilità di aderire a una superficie curva positivamente rispetto a una superficie piana, l'innesto di catene polimeriche sulla superficie della nanoparticella inverte questo comportamento.




chemistry



Article

Adsorption of Polymer-Grafted Nanoparticles on Curved Surfaces

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Abstract: Nanometer-curved surfaces are abundant in biological systems as well as in nano-sized technologies. Properly functionalized polymer-grafted nanoparticles (PGNs) adhere to surfaces with different geometries and curvatures. This work explores some of the energetic and mechanical characteristics of the adhesion of PGNs to surfaces with positive, negative and zero curvatures using Coarse-Grained Molecular Dynamics (CGMD) simulations. Our calculated free energies of binding of the PGN to the curved and flat surfaces as a function of separation distance show that curvature of the surface critically impacts the adhesion strength. We find that the flat surface is the most adhesive, and the concave surface is the least adhesive surface. This somewhat counterintuitive finding suggests that while a bare nanoparticle is more likely to adhere to a positively curved surface than a flat surface, grafting polymer chains to the nanoparticle surface inverts this behavior. Moreover, we studied the rheological behavior of PGN upon separation from the flat and curved surfaces under external pulling force. The results presented herein can be exploited in drug delivery and self-assembly applications.

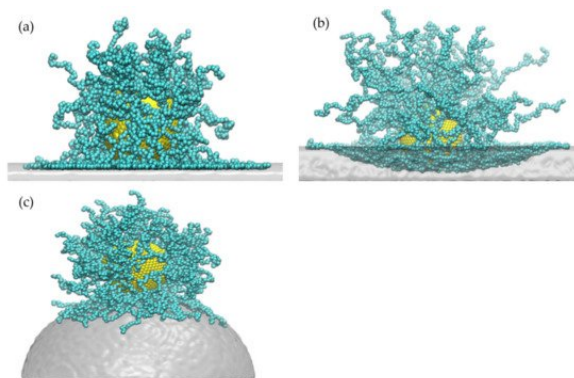


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Keywords: adhesion; self-assembly; drug delivery; curved surface; template-assisted self-assembly; nanotechnology; single-molecule system; polymer nanocomposite

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Materiale di Confezionamento Alimentare Ecologico ed Efficace: il Futuro è vicino!

Questo articolo mira a introdurre le attività antibatteriche e antiossidanti dell'olio di Piper betle Linn (PBLO) nel film di chitosano (pCS), denominato film pCS-PBLO. In particolare, il film pCS-PBLO può prolungare la durata di conservazione delle arance reali fino a due settimane a 25 ° C, che è più lunga rispetto al campione non rivestito e rivestito con solo chitosano.



Article

Development of Antibacterial, Antioxidant, and UV-Barrier Chitosan Film Incorporated with *Piper betle* Linn Oil as Active Biodegradable Packaging Material

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Abstract: This study aims to introduce the antibacterial and antioxidant activities of the *Piper betle* Linn oil (PBLO) into chitosan film (pCS), named as pCS-PBLO film. The morphology, structure, and properties of the pCS-PBLO film, along with the PBLO concentration between 0.4% and 1.2% (v/v), were determined. The film surface became rough and heterogeneous with the addition of PBLO, which directly influenced on mechanical strength of the resultant film. The addition of the PBLO did not affect thermal stability but significant effect on flexibility and mobility of the film. Importantly, the film enhanced the UV-protective property and antioxidant activity as incorporated-PBLO. Moreover, the resulting film revealed the great inhibition efficiency against the negative-gram (*E. coli*, *P. aeruginosa*, and *S. typhi*) and positive-gram (*S. aureus*) bacteria based on phenolic compounds, such as the acetyleugenol, eugenol, 4-allyl-1,2-diacetoxybenzen, and chavicol acetate in PBLO components. In particular, the pCS-PBLO film may extend the shelf life of king oranges up to two weeks at 25 °C that is longer as compared to the uncoated sample and coated with chitosan alone. These results suggest that the pCS-PBLO film can be used as environmental-friendly and effective food packaging material in the future.

Keywords: antibacterial activity; antioxidant activity; chitosan film; *Piper betle* Linn oil; UV-barrier

BPA & effetti sulla salute

Il bisfenolo A (BPA) è un composto sintetico organico che funge da monomero per produrre plastica in polycarbonato, ampiamente utilizzato negli imballaggi per alimenti e bevande, dispositivi medici, carta termica e materiali dentali. Il BPA può contaminare cibo, bevande, aria e suolo. Questa review mira a fornire un'analisi ampia e completa delle prove più recenti sui potenziali meccanismi attraverso i quali il BPA ha effetti sulla salute umana.




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Review

Potential Mechanisms of Bisphenol A (BPA) Contributing to Human Disease

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Abstract: Bisphenol A (BPA) is an organic synthetic compound serving as a monomer to produce polycarbonate plastic, widely used in the packaging for food and drinks, medical devices, thermal paper, and dental materials. BPA can contaminate food, beverage, air, and soil. It accumulates in several human tissues and organs and is potentially harmful to human health through different molecular mechanisms. Due to its hormone-like properties, BPA may bind to estrogen receptors, thereby affecting both body weight and tumorigenesis. BPA may also affect metabolism and cancer progression, by interacting with GPR30, and may impair male reproductive function, by binding to androgen receptors. Several transcription factors, including PPAR γ , C/EBP, Nrf2, HOX, and HAND2, are involved in BPA action on fat and liver homeostasis, the cardiovascular system, and cancer. Finally, epigenetic changes, such as DNA methylation, histones modification, and changes in microRNAs expression contribute to BPA pathological effects. This review aims to provide an extensive and comprehensive analysis of the most recent evidence about the potential mechanisms by which BPA affects human health.

Keywords: bisphenol A; receptors; transcription factors; epigenetics; metabolism; cancer

Nuovi valori sociali e nuove politiche: bioeconomia circolare e decrescita sostenibile

Questo lavoro presenta una metodologia per determinare la percentuale di decrescita necessaria in qualsiasi catena di approvvigionamento alimentare, analizzando quattro scenari in un approccio di valutazione del ciclo di vita nel tempo tra il 2020 e il 2040.



sustainability



Article

Introducing a Degrowth Approach to the Circular Economy Policies of Food Production, and Food Loss and Waste Management: Towards a Circular Bioeconomy

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Abstract: There is a growing debate surrounding the contradiction between an unremitting increase in the use of resources and the search for environmental sustainability. Therefore, the concept of sustainable degrowth is emerging aiming to introduce in our societies new social values and new policies, capable of satisfying human requirements whilst reducing environmental impacts and consumption of resources. In this framework, circular economy strategies for food production and food loss and waste management systems, following the Sustainable Development Goals agenda, are being developed based on a search for circularity, but without setting limits to the continual increase in environmental impacts and resource use. This work presents a methodology for determining the percentage of degrowth needed in any food supply chain, by analyzing four scenarios in a life cycle assessment approach over time between 2020 and 2040. Results for the Spanish case study suggested a degrowth need of 26.8% in 2015 and 58.9% in 2040 in order to achieve compliance with the Paris Agreement targets, highlighting the reduction of meat and fish and seafood consumption as the most useful path.

Keywords: degrowth; food supply chain; food loss and waste; Global North; Paris Agreement; spiral bioeconomy; circular bioeconomy

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PFAS una sfida da conoscere meglio

L'articolo esamina lo stato dell'arte sui PFAS (sostanze perfluoro alchiliche) con particolare attenzione alla complessità e alla sfida della regolamentazione dei composti PFAS a causa dell'incertezza e della mancanza di prove epidemiologiche riscontrate.



Review

An Overview of Per- and Polyfluoroalkyl Substances (PFAS) in the Environment: Source, Fate, Risk and Regulations

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Abstract: The current article reviews the state of art of the perfluoroalkyl and polyfluoroalkyl substances (PFASs) compounds and provides an overview of PFASs occurrence in the environment, wildlife, and humans. This study reviews the issues concerning PFASs exposure and potential risks generated with a focus on PFAS occurrence and transformation in various media, discusses their physicochemical characterization and treatment technologies, before discussing the potential human exposure routes. The various toxicological impacts to human health are also discussed. The article pays particular attention to the complexity and challenging issue of regulating PFAS compounds due to the arising uncertainty and lack of epidemiological evidence encountered. The variation in PFAS regulatory values across the globe can be easily addressed due to the influence of multiple scientific, technical, and social factors. The varied toxicology and the insufficient definition of PFAS exposure rate are among the main factors contributing to this discrepancy. The lack of proven standard approaches for examining PFAS in surface water, groundwater, wastewater, or solids adds more technical complexity. Although it is agreed that PFASs pose potential health risks in various media, the link between the extent of PFAS exposure and the significance of PFAS risk remain among the evolving research areas. There is a growing need to address the correlation between the frequency and the likelihood of human exposure to PFAS and the possible health risks encountered. Although USEPA (United States Environmental Protection Agency) recommends the 70 ng/L lifetime health advisory in drinking water for both perfluorooctane sulfonate (PFO) perfluorooctanoic acid (PFOA), which is similar to the Australian regulations, the German Ministry of Health proposed a health-based guidance of maximum of 300 ng/L for the combination of PFOA and PFOS. Moreover, there are significant discrepancies among the US states where the water guideline levels for the different states ranged from 13 to 1000 ng L⁻¹ for PFOA and/or PFOS. The current review highlighted the significance of the future research required to fill in the knowledge gap in PFAS toxicology and to better understand this through real field data and long-term monitoring programs.

Keywords: poly-fluoroalkyl substances (PFASs); toxicology; PFAS health risk; regulatory values

Prolungamento shelf life di fragole con coating di chitosano edibile in forma nano

L'articolo presenta il rivestimento delle fragole raccolte con nanoparticelle (NP) commestibili di chitosano. Le NP si sono formate mediante l'applicazione di onde ultrasoniche su una soluzione acida di chitosano. Tale meccanismo di trattamento determina un prolungamento della shelf life delle fragole rispetto ad altri rivestimenti.



applied nano



Article

Extending the Shelf Life of Strawberries by the Sonochemical Coating of their Surface with Nanoparticles of an Edible Anti-Bacterial Compound

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Abstract: The current paper presents the coating of harvested strawberries with edible nanoparticles of Chitosan. The NPs were formed by the application of ultrasonic waves on an acidic solution of chitosan. In a one-step process the nanoparticles were created and subsequent to their formation they were deposited on the strawberries surface. The shelf life of the NPs coated was compared with the deposition of the same amount of non-sonicated chitosan, i.e., coating of individual chitosan molecules on the fruit. The characterization of the coated fruits was carried out by monitoring the weight loss, TSS (total soluble solids), pH, TA (titratable acidity), and Vitamin C. Finally, the freshness of the strawberries was determined by eye observation. In addition, the characterization of the chitosan NPs was also conducted in this study by (DLS) dynamic light scattering and (SEM) scanning electron microscopy.

Keywords: Sonochemistry; chitosan; nanoparticles; edible coating; strawberry

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