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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.*

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Rilevamento di sostanze perfluoroalchiliche e polifluoroalchiliche nel caffè preparato in capsule

Poiché i materiali di imballaggio degli alimenti sono a diretto contatto con gli alimenti che mangiamo e cuciniamo sotto calore o pressione, i consumatori sono preoccupati per i loro effetti negativi sui prodotti alimentari. Le sostanze perfluoroalchiliche e polifluoroalchiliche (PFAS) sono spesso utilizzate negli imballaggi alimentari a causa delle loro proprietà idrofobiche; tuttavia, alcuni PFAS sono cancerogeni, il che ha spinto ulteriori studi sui loro effetti. In questo studio, è stato stabilito un metodo di pretrattamento di 31 PFAS nel caffè utilizzando il metodo di estrazione QuEChERS e analizzato mediante cromatografia liquida-spettrometria di massa tandem.

foods

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Article

Perfluoroalkyl and Polyfluoroalkyl Substance Detection in Brewed Capsule Coffee

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Abstract: As food packaging materials are in direct contact with the food we eat and cook under heat or pressure, consumers are apprehensive of their adverse effects on the food products. Perfluoroalkyl and polyfluoroalkyl substances (PFASs) are often used in food packaging because of their hydrophobic properties; however, some PFASs are carcinogens, thus prompting further studies on their effects. In this study, a pretreatment method of 31 PFASs in coffee was established using the QuEChERS extraction method and analyzed by liquid chromatography–tandem mass spectrometry. We brewed 32 types of capsule coffee distributed in Korea, analyzed them for PFASs, and evaluated their safety. The results show that perfluorooctanoic acid and 8:2 fluorotelomer sulfonate levels are higher in machine-brewed capsule coffee than in capsule coffees brewed manually through a paper filter. However, the hazard quotient and excess cancer risk for all coffee samples are lower than the World Health Organization standards, and therefore, these samples are considered safe. The results of this study may aid in expanding the existing literature on PFAS detection in relation to human health.

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https://www.mdpi.com/2304-8158/14/6/980

Nanoarchitettura dell'imballaggio alimentare sostenibile: materiali, metodi e fattori ambientali

La nanoarchitettura influenza le proprietà degli oggetti su micro e persino macro-scala, con l'obiettivo di sviluppare migliori strutture per la protezione del prodotto. Sebbene le sue applicazioni siano state analizzate in diverse aree, la nanoarchitettura degli imballaggi alimentari, il fulcro di questa recensione, non è stata discussa, per quanto ne sappiamo. La gerarchia (A) strutturale e (B) funzionale degli imballaggi alimentari è discussa qui per migliorare la protezione, prolungare la durata di conservazione e preservare la qualità nutrizionale di diversi prodotti tra cui carne, pesce, latticini, frutta, verdura, prodotti gelificati e bevande. Il marketing, la sicurezza, la sostenibilità e l'etica sono discussi anche nel contesto della redditività industriale e della soddisfazione del consumatore

materials

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Review

Nanoarchitectonics of Sustainable Food Packaging: Materials, Methods, and Environmental Factors

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Abstract: Nanoarchitectonics influences the properties of objects at micro- and even macro-scales, aiming to develop better structures for protection of product. Although its applications were analyzed in different areas, nanoarchitectonics of food packaging—the focus of this review—has not been discussed, to the best of our knowledge. The (A) structural and (B) functional hierarchy of food packaging is discussed here for the enhancement of protection, extending shelf-life, and preserving the nutritional quality of diverse products including meat, fish, dairy, fruits, vegetables, gelled items, and beverages. Interestingly, the structure and design of packaging for these diverse products often possess similar principles and methods including active packaging, gas permeation control, sensor incorporation, UV/pulsed light processing, and thermal/plasma treatment. Here, nanoarchitechtonics serves as the unifying component, enabling protection against oxidation, light, microbial contamination, temperature, and mechanical actions. Finally, materials are an essential consideration in food packaging, particularly beyond commonly used polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), polystyrene (PS), and polyvinyl chloride (PVC) plastics, with emphasis on biodegradable (polybutylene succinate (PBS), polyvinyl alcohol (PVA), polycaprolactone (PCL), and polybutylene adi-

Materials **2025**, *18*, 1167 https://doi.org/10.3390/ma18051167

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Strategie analitiche incrociate per affrontare i “farmaci sotto mentite spoglie” presentati come integratori alimentari, una nuova minaccia per la salute umana

Gli integratori alimentari a base vegetale (FS) di dubbia tracciabilità sono ora emersi come una nuova minaccia per la salute umana. Gli integratori alimentari adulterati con ingredienti farmaceutici sono considerati ″medicinali sotto mentite spoglie″ dalle autorità regolatorie, che è una sottocategoria dei medicinali falsificati. Nel contesto della produzione e del commercio illegali, nonché in assenza di un sistema ufficiale di fitovigilanza e/o farmacovigilanza, i dipartimenti di emergenza e i centri antiveleni costituiscono un sistema di allerta precoce per rilevare i sospetti FS ingeriti.

molecules

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Article

Cross-Analytical Strategies to Tackle “Medicines in Disguise” Presented as Food Supplements, a New Threat for Human Health

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Abstract: Plant-based food supplements (FS) of doubtful traceability have now emerged as a new threat to human health. Food supplements adulterated with pharmaceutical ingredients are considered “medicines in disguise” by regulatory authorities, which is a sub-category of falsified medicines. In the context of illegal manufacture and trade, as well as in the absence of an official phyto- and/or pharmacovigilance system, emergency

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Lo sviluppo di film multifunzionali termoreattivi in chitosano adatti al packaging alimentare

Abbiamo sviluppato film di gelatina di chitosano a base biologica, film CHG-LO, che incorporano olio essenziale di lavanda (15-26% in peso di LO) e acido oleico (33-47% in peso di OA) con superfici lisce e spessori di 0,42-0,99 mm. Per la loro fabbricazione, le nanoemulsioni sono state preparate per possedere una dispersione uniforme e stabilità colloidale con dimensioni medie delle goccioline di 475-854 nm, indici di polidispersione (PDI) di 0,095-0,235 e potenziali zeta di 23,7-56,9 mV a 40 °C, dove l'OA fungeva da tensioattivo e materiale a cambiamento di fase. Le opacità dei film CHG-LO sono aumentate da 1,8 a 5,5 volte rispetto al gruppo di controllo e le loro proprietà di blocco della luce UV-visibile sono migliorate.

polysaccharides

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Article

The Development of Thermoresponsive Multifunctional Chitosan Films Suitable for Food Packaging

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Abstract: We developed bio-based chitosan–gelatin films, CHG-LO films, incorporating lavender essential oil (15–26 wt% LO) and oleic acid (33–47 wt% OA) with smooth surfaces and thicknesses of 0.42–0.99 mm. For their manufacture, the nanoemulsions were prepared to possess uniform dispersion and colloidal stability with average droplet sizes of 475–854 nm, polydispersity indices (PDI) of 0.095–0.235, and zeta potentials of 23.7–56.9 mV at 40 °C, where OA served as surfactant and phase change material. The opacities of the CHG-LO films increased by 1.8 to 5.5 times compared to the control group, and their UV-visible light-blocking properties improved. These films demonstrated cyclic thermal buffering character, with heat storage capacities ranging from 14.0 to 36.0 $J \cdot g^{-1}$ between −26 °C and 20 °C compatible with that of OA. Additionally, they showed reduced water vapor transmission rates and swelling degrees in acidic and neutral environments. The total phenolic contents of the CHG-LO films increased 1.5–4.2 times compared to the control associated with the presence of LO phenolic groups in the structure. DPPH (2,2-diphenyl-1 picrylhydrazyl) and ABTS (2,2′–azino–bis(3–ethylbenzothiazoline–6–sulphonic acid)) scavenging activity test results show that the antioxidant properties of these films improved with increasing LO-OA content up to 2.2 and 1.3 times the control,

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Recenti progressi nella fabbricazione di imballaggi intelligenti per la conservazione degli alimenti: una rassegna

Il progresso delle tecnologie di imballaggio intelligenti è emerso come un'innovazione fondamentale nell'industria alimentare, migliorando significativamente la sicurezza e la conservazione degli alimenti. Questa rassegna esplora gli ultimi sviluppi nella fabbricazione di imballaggi intelligenti, con particolare attenzione alle applicazioni nella conservazione degli alimenti. I sistemi di imballaggio intelligenti, che includono sensori, indicatori e tecnologie RFID, offrono il monitoraggio in tempo reale della qualità e della sicurezza degli alimenti rilevando i cambiamenti nelle condizioni ambientali e nell'attività microbica.

processes

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Review

Recent Advances in the Fabrication of Intelligent Packaging for Food Preservation: A Review

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Abstract: The advancement of intelligent packaging technologies has emerged as a pivotal innovation in the food industry, significantly enhancing food safety and preservation. This review explores the latest developments in the fabrication of intelligent packaging, with a focus on applications in food preservation. Intelligent packaging systems, which include sensors, indicators, and RFID technologies, offer the real-time monitoring of food quality and safety by detecting changes in environmental conditions and microbial activity. Innovations in nanotechnology, bio-based materials, and smart polymers have led to the development of eco-friendly and highly responsive packaging solutions. This review underscores the role of active and intelligent packaging components—such as oxygen scavengers, freshness indicators, and antimicrobial agents in extending shelf life and ensuring product integrity. Moreover, it highlights the transformative potential of intelligent packaging in food preservation through the examination of recent case studies. Finally, this review provides a comprehensive overview of current trends, challenges, and potential future directions in this rapidly evolving field.

Processes **2025**, *13*, 539 https://doi.org/10.3390/pr13020539

https://www.mdpi.com/2227-9717/13/2/539

Una revisione critica della percezione dei consumatori e dell'impatto ambientale delle bioplastiche negli imballaggi alimentari sostenibili

Con l'aumento della consapevolezza delle questioni ambientali e la crescita della domanda di sostenibilità tra le società, le imprese e i consumatori, ridurre al minimo l'impatto ambientale degli imballaggi alimentari è diventato sempre più importante. Le bioplastiche offrono una soluzione promettente grazie all'uso di risorse rinnovabili (come le piante), alla loro biodegradabilità e alla loro capacità di mantenere le proprietà protettive delle plastiche tradizionali. Questa revisione discute i recenti progressi e le tendenze nel settore degli imballaggi alimentari sostenibili, sottolineando il ruolo delle bioplastiche.

sustainability

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Review

A Critical Review of Consumer Perception and Environmental Impacts of Bioplastics in Sustainable Food Packaging

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Abstract: As awareness of environmental issues deepens and the demand for sustainability grows among societies, businesses, and consumers, minimizing the environmental impact of food packaging has become increasingly important. Bioplastics offer a promising solution due to their use of renewable resources (such as plants), their biodegradability, and their ability to retain the protective properties of traditional plastics. This review discusses recent advancements and trends in sustainable food packaging, emphasizing the role of bioplastics. Several typical types of bioplastics are introduced, along with an analysis of their advantages and limitations. Furthermore, this study investigates consumers' attitudes toward bioplastic food packaging, emphasizing their perceptions of its sustainability and practical use. The findings reveal that consumers generally hold a positive attitude toward bioplastics, particularly appreciating their biodegradable and compostable properties. However, their expectations are often overly high, as they believe bioplastics must meet two key criteria: being made from renewable raw materials and being fully biodegradable or compostable. Additionally, most consumers lack the knowledge or ability to dispose

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Equilibri in mutamento: un nuovo quadro di valutazione delle dinamiche di potere in evoluzione tra il Nord e il Sud del mondo

La disparità tra il Sud e il Nord del mondo ha acquisito importanza nella classificazione dei paesi in base a caratteristiche economiche, sociali e di governance piuttosto che a legami storici. Le misure tradizionali come il PIL pro capite spesso trascurano le intricate dinamiche di leadership essenziali per comprendere gli sviluppi in entrambe le regioni. Questo studio presenta un nuovo approccio alla valutazione delle transizioni di leadership globale, tra cui la performance economica, la mobilità sociale e le strutture di governance, ampliando l'indice Global South Leadership (GSL). Calcolando la media dei punteggi di 18 indici per 192 paesi, vengono creati grafici a dispersione per identificare le relazioni e le tendenze tra i paesi del Nord e del Sud del mondo e tra le regioni all'interno.

world

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Article

Shifting Equilibria: A New Framework Assessing Changing Power Dynamics Between the Global North and Global South

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Abstract: The disparity between the Global South and the Global North has gained prominence in classifying countries according to economic, social, and governance characteristics rather than historical links. Historically, the Global North has long been regarded as the dominant group of nations, far outperforming Global South countries; however, several Global South nations now surpass and outperform the Global North nations in multiple measures. Traditional measures like GDP per capita often overlook the intricate leadership dynamics essential for understanding developments in both regions. This study presents a novel approach to evaluating global leadership transitions, including economic performance, social mobility, and governance structures, by expanding on the Global South Leadership (GSL) Index. By averaging scores of 18 indices for 192 countries, scatter plots are created to identify relationships and trends between Global North and South countries and among the regions within. This study extrapolates why some Global South countries are overperforming and others are underperforming, and the ones that have

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