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Effetti del tipo di materiale di imballaggio, del tempo di conservazione e del contenuto di lipidi sulla migrazione degli ftalati nella carne di pesce affumicato.

L'obiettivo di questo lavoro è lo studio dell'influenza di sei diversi imballaggi di plastica (polietilene tereftalato, polietilene ad alta densità, polietilene biodegradabile ad alta densità, polietilene a bassa densità, polipropilene e polietilene poliammidico) sulla migrazione di residui di ftalati in carpe affumicate, trote e salmoni conservati a -18 °C per tre e sei mesi. Le concentrazioni di sei residui di ftalati sono state determinate utilizzando il metodo della gascromatografia-spettrometria di massa. Tra gli ftalati studiati, il polipropilene è risultato il materiale con la più bassa migrazione nella carne di pesce. Un'ulteriore quantità di migrazione di DEHP nel pesce è stata rilevata con un contenuto di grassi più elevato.





Effects of Packaging Material Type, Storage Time and Lipid Content on Phthalate Migration in Smoked Fish Meat

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Abstract: The objective of this study is an investigation of the influence of six different plastic packages (polyethylene terephthalate, high-density polyethylene, biodegradable high-density polyethylene, low-density polyethylene, polypropylene and polyamide polyethylene) on the migration of phthalate residues in smoked carp, trout and salmon stored at -18 °C for three and six months. Six phthalate residues concentrations were determined using the gas chromatography-mass spectrometry method. Diisobutyl phthalate (DIBP) and dibutyl phthalate (DBP) migrated the most into salmon meat from PAPE packaging after six months of storage, reaching 73.77 µg/kg and 78.45 µg/kg, respectively. The highest concentrations of bis(2-ethylhexyl) phthalate (DEHP) after six months of storage were present in salmon meat packed in polyamide polyethylene (253.56 µg/kg) and the lowest in carp meat packages in polypropylene (157.72 μg/kg). Phthalate residues in all the samples showed higher levels after three and six months of storage compared to the control sample. Among the investigated phthalates, polypropylene was the material with the lowest migration into fish meat. A further amount of DEHP migration in the fish was detected with a higher fat content. We acknowledge that levels of phthalates should be monitored, and research in this field should be continued, especially since there are no legal restrictions regarding the maximum level of phthalates in food.

Keywords: phthalates; DEHP; smoked fish; plastic packaging; migration

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Citation: Durić, B.; Kartalović, B.; Habschied, K.; Novakov, N.; Vranešević, J.; Brkić, B.; Mastanjević, K. Effects of Packaging Material Type, Storage Time and Lipid Content on Phthalate Migration in Smoked Fish Meat. Appl. Sci. 2024, 14, 1660. https://doi.org/10.3390/ app14041660

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Materiali superidrofobici da rifiuti: approccio innovativo.

I materiali superidrofobici, noti per le loro eccezionali proprietà idrorepellenti, hanno trovato ampie applicazioni in diversi campi come le superfici autopulenti, i rivestimenti antighiaccio, i tessuti resistenti all'acqua e i materiali di imballaggio alimentare. Questa review approfondisce il concetto di materiali superidrofobici derivati dai rifiuti e i metodi utilizzati per la loro sintesi. Inizia definendo la superidrofobicità ed evidenziando le sue caratteristiche uniche. Sottolinea il ruolo fondamentale svolto dai materiali superidrofobici in tutti i settori. La revisione delinea cinque sezioni chiave che saranno ulteriormente sviluppate per offrire una comprensione completa di questo approccio innovativo e sostenibile ai materiali superidrofobici.





Revieu

Superhydrophobic Materials from Waste: Innovative Approach

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Abstract: Superhydrophobic materials, known for their exceptional water-repellent properties, have found widespread applications in diverse fields such as self-cleaning surfaces, anti-icing coatings, and water-resistant textiles. In recent years, researchers have explored a sustainable approach by repurposing waste materials to create superhydrophobic surfaces. This eco-friendly approach not only reduces environmental impact but also aligns with circular economy principles, contributing to a more sustainable future. Creating superhydrophobic materials from waste involves a combination of surface modification techniques and hierarchical structuring, with rigorous characterization to ensure the desired properties. These materials showcase their potential in various industries, opening doors to more environmentally friendly technologies. This review delves into the concept of superhydrophobic materials derived from waste and the methods used for their synthesis. It begins by defining superhydrophobicity and highlighting its unique characteristics. It emphasizes the pivotal role played by superhydrophobic materials across industries. The review then explores waste materials' untapped potential, discussing the advantages of harnessing waste for superhydrophobic material development. Concrete examples of promising waste materials are provided, including agricultural residues and industrial byproducts. The review outlines five key sections that will be further developed to offer a comprehensive understanding of this innovative and sustainable approach to superhydrophobic materials.



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Keywords: superhydrophobic surfaces; industrial waste; agrowaste; contact angles; water repellence

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Effetto della dimensione delle particelle sulle proprietà fisiche dei compositi PLA/buccia di patata.

Negli ultimi anni, i riempitivi dei sottoprodotti agricoli sono stati studiati nei compositi per influenzare le proprietà fisiche del materiale di imballaggio, aumentare la biodegradabilità e ridurre i costi. In generale, le proprietà dei compositi sono influenzate principalmente dal tipo, dalla quantità e dalle dimensioni dei riempitivi. Lo scopo di questo studio era di caratterizzare le particelle di buccia di patata come riempitivo in una matrice di acido polilattico (PLA) e di determinare l'effetto della dimensione delle particelle sulle proprietà fisiche del composito. Pertanto, diverse frazioni di polvere di buccia di patata (0-53 μ m, 125-250 μ m e 315-500 μ m) sono state incorporate nella matrice di PLA tramite compounding e stampaggio a iniezione.





Artide

Effect of Particle Size on the Physical Properties of PLA/Potato Peel Composites

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Abstract: In recent years, agricultural by-product fillers have been investigated in composites to influence the physical properties of the packaging material, increase biodegradability, and reduce costs. In general, the properties of composites are mainly influenced by the type, amount, and size of fillers. The aim of this study was to characterize potato peel particles as a filler in a poly(lactic acid) (PLA) matrix and to determine the effect of particle size on the physical properties of the composite. Therefore, different fractions of potato peel powder (0-53 µm, 125-250 µm, and 315-500 µm) were incorporated into PLA matrix via compounding and injection-molding. Microscopic analysis of the injection-molded samples revealed that the average particle shape did not differ between the different fractions. Overall, increasing the particle size of potato peel particles resulted in increased stiffness and decreased ductility. The cold crystallization temperature and water vapor transmission rate of the composites were independent of particle size but increased upon the incorporation of potato peel particles. In conclusion, the effect of particle incorporation on packaging-related properties was higher than the effect of using different particle size fractions. This means that potato peel particles, regardless of their particle size distribution, are promising fillers for composites, with the potential to improve biodegradability, maintain some level of protection for the packaged product, and reduce the cost of the composites.

Keywords: biocomposites; agricultural by-products; side stream valorization; tensile properties; water vapor transmission rate; particle characterization; filler size



Citation: Miller, K.; Reichert, C.L.; Loeffler, M.; Schmid, M. Effect of Particle Size on the Physical Properties of PLA/Potato Peel Composites. Compounds 2024, 4,

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Sviluppo e applicazione di pellicole commestibili bioattive a doppio strato basate su amido e siero di latte fermentato in laboratorio e/o soluzione di mango.

Questo studio mirava a sviluppare film commestibili bioattivi a doppio strato a base di amido (strato primario) e soluzioni di siero di latte fermentato in laboratorio e/o polpa di mango in polvere (strato secondario). I film commestibili bioattivi a doppio strato sono stati valutati per le loro proprietà fisiche, le proprietà meccaniche, la capacità antiossidante e la disponibilità di Lactobacillus rhamnosus per 28 giorni (4 e 20 °C). Una pellicola commestibile a doppio strato bioattiva selezionata è stata applicata al sushi per valutarne l'accettabilità sensoriale.





Article

Development and Application of Bioactive Bi-Layer Edible Films Based on Starch and LAB-Fermented Whey and/or Mango Solution

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Citation: Hernández-Carranza, P.; Mendoza-Gutiérrez, B.A.; Estévez-Sánchez, K.H.; Ramírez-López, C.; Beristain-Bauza, S.d.C.; Avila-Reyes, S.V.; Ruíz-López, I.I.; Ochoa-Velasco, C.E. Development and Application of Bioactive Bi-Layer Edible Films Based on Starch and LAB-Fermented Whey and/or Mango Solution. Fermentation 2024, 10, 105. https://doi.org/10.3390/ fermentation10020105 Abstract: This study aimed to develop bioactive bi-layer edible films based on starch (primary layer) and LAB-fermented whey and/or mango pulp powder solutions (secondary layer). Bioactive bi-layer edible films were evaluated for their physical properties, mechanical properties, antioxidant capacity, and Lactobacillus rhamnosus availability for 28 days (4 and 20 °C). Selected bioactive bi-layer edible film was applied to sushi to evaluate its sensory acceptance. The results indicated that bi-layer edible films based on LAB-fermented whey/mango solutions presented a higher quantity of phenolic compounds (95.87−107.67 mg GAE/100 g) and higher antioxidant capacity (74.84−77.64%). In addition, the higher viability (106−107 CFU/g) of L. rhamnosus after edible film production was obtained in those formulated with whey. After the storage period, the antioxidant capacity of all edible films was significantly affected by the storage time, while edible films containing whey in their formulation and stored at 4 °C had a L. rhamnosus count higher than 6 log cycles, which is the minimum required threshold to exert its beneficial effects in humans. The sushi covered with the selected bi-layer edible film was well accepted by the consumers, showing acceptance values be-

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Idrogeno dalla gassificazione dei rifiuti.

L'idrogeno è un vettore energetico versatile per una miriade di applicazioni; tuttavia, la sua produzione da rifiuti/residui viene spesso trascurata. La gassificazione e la successiva conversione del gas di sintesi grezzo in idrogeno rappresentano un'alternativa interessante per produrre idrogeno rinnovabile. In questo documento vengono riassunti i recenti sviluppi nella ricerca e sviluppo sulla gassificazione dei rifiuti (rifiuti solidi urbani, pneumatici, rifiuti di plastica) e viene fornita una panoramica sui processi di gassificazione idonei.





Renien

Hydrogen from Waste Gasification

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Abstract Hydrogen is a versatile energy vector for a plethora of applications; nevertheless, its production from waste/residues is often overlooked. Gasification and subsequent conversion of the raw synthesis gas to hydrogen are an attractive alternative to produce renewable hydrogen. In this paper, recent developments in R&D on waste gasification (municipal solid waste, tires, plastic waste) are summarised, and an overview about suitable gasification processes is given. A literature survey indicated that a broad span of hydrogen relates to productivity depending on the feedstock, ranging from 15 to 300 g H₂/kg of feedstock. Suitable gas treatment (upgrading and separation) is also covered, presenting both direct and indirect (chemical looping) concepts. Hydrogen production via gasification offers a high productivity potential. However, regulations, like frame conditions or subsidies, are necessary to bring the technology into the market.

Keywords: hydrogen production; waste gasification; thermochemical conversion



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1. Introduction

Environmentally benign fuels, which can replace today's fossil-based fuels, such as oil, natural gas, and coal for combustion, either in stationary or traction applications, are of the utmost importance. One such fuel is hydrogen, which is the fuel of the future. Hydrogen is an energy carrier and energy storage medium, maintaining potential applications in many industrial processes and power generations. Hydrogen has gained momentum in recent years as a potential fuel for aviation, vehicles, and domestic heating requirements, either by direct combustion or in so-called "cold combustion" in fuel cells to realize a sustainable world. The introduction of hydrogen in our societies would mean a paradigm shift in the use renewable energy sources, leading principally to the decarbonization of the energy

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Recenti progressi dei materiali per imballaggi polimerici biodegradabili: la nanotecnologia migliora le prestazioni di barriera sia all'ossigeno che al vapore acqueo.

I polimeri biodegradabili sono diventati un argomento di grande interesse scientifico e industriale per la loro natura rispettosa dell'ambiente. A vantaggio dell'economia di mercato e dell'ambiente, i materiali biodegradabili dovrebbero svolgere un ruolo più critico nei materiali di imballaggio, che attualmente rappresentano oltre il 50% dei prodotti di plastica. Tuttavia, permangono varie sfide per i polimeri biodegradabili per applicazioni pratiche di imballaggio. In particolare per quanto riguarda i problemi di scarsa barriera all'ossigeno/umidità, che limitano notevolmente l'applicazione degli attuali polimeri biodegradabili negli imballaggi alimentari.





Review

Recent Progress of Biodegradable Polymer Package Materials: Nanotechnology Improving Both Oxygen and Water Vapor Barrier Performance

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Abstract Biodegradable polymers have become a topic of great scientific and industrial interest due to their environmentally friendly nature. For the benefit of the market economy and environment, biodegradable materials should play a more critical role in packaging materials, which currently account for more than 50% of plastic products. However, various challenges remain for biodegradable polymers for practical packaging applications. Particularly pertaining to the poor oxygen/moisture barrier issues, which greatly limit the application of current biodegradable polymers in food packaging. In this review, various strategies for barrier property improvement are summarized, such as chain architecture and crystallinity tailoring, melt blending, multi-layer co-extrusion, surface coating, and nanotechnology. These strategies have also been considered effective ways for overcoming the poor oxygen or water vapor barrier properties of representative biodegradable polymers in mainstream research.



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Keywords: surface-nanotechnology; biodegradable polymers; packaging materials; oxygen barrier; water vapor barrier

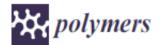
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Personalizzazione del film a doppio strato di pectina-PLA con proprietà ottimali come materiale per buste alimentari

Questo studio si concentra sullo sviluppo di un film biodegradabile utilizzando na nuova pectina ibrida di buccia di agrumi. È stato proposto e ottimizzato un approccio a doppio strato con PLA utilizzando la la Response Surface Methodology (RSM) per integrare i limiti delle proprietà meccaniche e di barriera dei film di pectina. La composizione ottimizzata del film (2,90 g di PLA e 1,96 g di pectina) ha mostrato una maggiore resistenza meccanica con una resistenza alla trazione (TS) di 7,04 MPa e un allungamento a rottura (EAB) del 462,63%. Inoltre, ha dimostrato una minore quantità di vapore acqueo (1,45 × 10–10 g/msPa), ossigeno (2,79 × 10–7 g/ms) permeabilità e solubilità (23,53%).





Article

Tailoring Pectin-PLA Bilayer Film for Optimal Properties as a Food Pouch Material

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Abstract This study focuses on developing a biodegradable film using a novel hybrid citrus peel pectin. A bilayer approach with PLA was proposed and optimized using Response Surface Methodology (RSM) to complement pectin films' mechanical and barrier property limitations. The optimized film composition (2.90 g PLA and 1.96 g pectin) showed enhanced mechanical strength with a tensile strength (TS) of 7.04 MPa and an elongation at break (EAB) of 462.63%. In addition, it demonstrated lower water vapor (1.45×10^{-10} g/msPa), oxygen (2.79×10^{-7} g/ms) permeability, and solubility (23.53%). Compared to single-layer pectin films, the optimized bilayer film had a 25% increased thickness, significantly improved water barrier (3806 times lower) and oxygen barrier (3.68 times lower) properties, and 22.38 times higher stretchability, attributed to hydrogen bond formation, as confirmed by FTIR analysis. The bilayer film, effectively protected against UV and visible light, could be a barrier against light-induced lipid oxidation. Moreover, it demonstrated superior seal efficiency, ensuring secure sealing in practical applications. The bilayer pouch containing mustard dressing exhibited stable sealing with no leakage after immersion in hot water and ethanol, making it suitable for secure food pouch packaging.

Keywords: pectin; PLA; bilayer film; biodegradable packaging; film optimization; food pouch

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