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Microcapsule di silice ecocompatibili con una migliore ritenzione della fragranza.

Le microcapsule sono ampiamente impiegate in varie applicazioni; tuttavia, la maggior parte sono composti da plastiche sintetiche. Pertanto, la sostituzione dei materiali componenti è essenziale per prevenire problemi ambientali associati alle microplastiche primarie. Qui riportiamo la sintesi di microcapsule eco-compatibili con nucleo di silice per la ritenzione della fragranza. Il guscio di silice è stato preparato tramite sintesi di modelli di emulsione olio/acqua utilizzando tetraetilosilicato (TEOS), che è stato aggiunto alle microcapsule di silice immature prima della completa formazione di gusci di silice primaria per promuovere la crescita dei semi per un'ulteriore reazione della silice.





Article

Eco-Friendly Silica Microcapsules with Improved Fragrance Retention

eco-friendly materials in industrial applications.

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Abstract: Microcapsules are employed extensively in various applications; however, most are composed of synthetic plastics. Thus, substitution of their component materials is essential to prevent environmental problems associated with primary microplastics. Herein, we report the synthesis of eco-friendly silica core-shell microcapsules for fragrance retention. The silica shell was prepared via oil/water emulsion template synthesis using tetraethyl orthosilicate (TEOS), which was added to the immature silica microcapsules prior to complete formation of primary silica shells to promote seeded growth for further reaction of silica. The thickness of the silica shell increased from 42.29 to 70.03 nm, while the Brunauer–Emmett–Teller surface area and internal pore area decreased from 155.16 and 30.08 m²/g to 92.28 and 5.36 m²/g, respectively. The silica microcapsules with lower surface areas retained fragrance for more than 80 days, even in a harsh environment of 15% sodium dodecyl sulfate at 60 °C, whereas the fragrance compound in those without additional TEOS treatment was completely released within seven days. Practical qualitative evaluation of fragrance was



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Keywords: microcapsules; silica shell; fragrance retention; seeded growth; oil/water emulsion template; microplastics alternatives

also performed for application in fragrance delivery because of the enhanced long-term fragrance retention ability. Our findings show the widespread potential of microcapsules synthesized from

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Recenti progressi nelle tecniche di depolimerizzazione della lignina: una panoramica comparativa degli approcci tradizionali e più ecologici.

A causa dell'aumento e dell'eccessivo consumo di combustibili fossili, le fonti energetiche alternative sostenibili sono assolutamente necessarie per sostituire i combustibili fossili. La conversione della biomassa in energia e sostanze chimiche a valore aggiunto è uno dei percorsi potenziali più promettenti per risolvere questo problema. Milioni di tonnellate di lignina, uno dei principali componenti della biomassa, vengono prodotte ogni anno come sottoprodotto di varie industrie, dove viene trattata come un materiale di basso valore. Tuttavia, poiché ha una natura polimerica aromatica, la lignina è una fonte comprovata per diversi prodotti a valore aggiunto. Gli studi suggeriscono che la scissione selettiva di un legame specifico della complessa struttura della lignina è una delle principali sfide della conversione della lignina in un prodotto mirato.





Revieu

Recent Advances in Lignin Depolymerization Techniques: A Comparative Overview of Traditional and Greener Approaches

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Abstract: Due to the increased and excessive consumption of fossil fuels, sustainable alternative energy sources are badly needed to replace fossil fuels. The conversion of biomass into energy and value-added chemicals is one of the most promising potential pathways to solve this problem. Millions of tons of lignin, one of the major components of biomass, are produced annually as a byproduct of various industries, where it is treated as a low-value material. However, since it has an aromatic polymer nature, lignin is a proven source for different value-added products. Studies suggest that the selective cleavage of a specific bond of the complex lignin structure is one of the major challenges of converting lignin to a targeted product. In this study, eight different lignin depolymerization methods, both traditional and green, are reviewed. Acid and base catalytic depolymerization methods are straightforward, but due to their low selectivity and comparatively severe reaction conditions, they are expensive and not eco-friendly. Pyrolysis-based depolymerization comes with similar problems but has a higher conversion. In contrast, greener approaches, such as oxidative, microwave-assisted, super/sub-critical fluids (SCF), ionic liquid (IL), and deep eutectic solvent (DES)-based depolymerization techniques, have shown higher efficiency in terms of converting the lignin into phenolic compounds even under milder reaction conditions. SCF, IL, and DES-based approaches will likely become more popular in the future for their greener nature. Overall, depolymerization of lignin with greener technologies could make this process more economically viable and sustainable.

Keywords: depolymerization techniques; lignin; comparison; greener advances; mechanism

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Sviluppo di compositi polimerici di legno da rifiuti di legno e plastica riciclati: proprietà termiche e meccaniche

L'esaurimento delle risorse naturali dovuto all'industrializzazione aggressiva degli ultimi decenni ha portato notevole attenzione alla ricerca volta a sviluppare prodotti green e sostenibili utilizzando materiali eco-compatibili. Lo scopo del presente studio era quello di sviluppare compositi polimerici di legno (WPC) utilizzando rifiuti di plastica riciclata (RPW) generati da laboratori universitari e rifiuti di legno riciclato (RWW) da attività di costruzione e demolizione (C & D) mediante tecnica di fusione-miscelazione. I WPC sono stati caratterizzati per le loro proprietà meccaniche e termiche, nonché per l'assorbimento e la morfologia dell'acqua. La micrografia SEM ha indicato una buona interazione tra matrice RWW e RPW.





Article

Development of Wood Polymer Composites from Recycled Wood and Plastic Waste: Thermal and Mechanical Properties

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Abstract: The depletion of natural resources due to the aggressive industrialization in the last decades has brought considerable attention to research aimed at developing green and sustainable products using eco-friendly materials. The purpose of the current study was to develop wood polymer composites (WPCs) using recycled plastic waste (RPW) generated from university laboratories and recycled wood waste (RWW) from construction and demolition (C&D) activities by melt-blending technique. The WPCs were characterised for their mechanical and thermal properties, as well as water uptake and morphology. The SEM micrograph indicated good interaction between RWW and RPW matrix. The mechanical strength of the WPCs was found to increase from 26.59 to 34.30 MPa, with an increase of the RWW content in the matrix. The thermal stability was higher in the composite with a higher percentage of RWW in the matrix. The wettability results indicated that the composite with a higher RWW (20%) had a higher water uptake. These results suggest that the produced WPCs can be a promising environmental-friendly material, while maintaining good mechanical, thermal, and wettability properties.

Keywords: recycled plastic waste; recycled wood waste; wood polymer composites; mechanical properties; thermal properties; wettability properties



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Numero Speciale: Lavorazione, Struttura, Dinamica e Proprietà Meccaniche dei Materiali Polimerici.

Le nuove sfide legate alla necessità di sviluppare nuovi materiali biodegradabili con nuove proprietà e strutture, difficili da lavorare con i metodi di lavorazione convenzionali, riguardano anche l'avanzamento e lo sviluppo di macchine, soprattutto quelle più comuni, come estrusori e macchine per lo stampaggio ad iniezione. L'obiettivo del numero speciale è quello di raccogliere le ricerche e le analisi attuali riguardanti le proprietà e la struttura di nuovi materiali polimerici di varie applicazioni, con particolare attenzione ai materiali biodegradabili, e mostrare le possibilità di applicare metodi di ottimizzazione nella lavorazione dei polimeri, che possono essere con sicurezza applicato con ottimi risultati e senza grande sforzo computazionale.





Editorial

Special Issue: Processing, Structure, Dynamics and Mechanical Properties of Polymeric Materials

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The current Special Issue entitled "Processing, structure, dynamics and mechanical properties of polymeric materials" brings together scientists working at universities, research institutes, laboratories and various industries to discuss cutting-edge research on processing new polymeric materials using standard and innovative machines and to understand the structure and properties of these materials. New challenges related to the need to develop new biodegradable materials with new properties and structures, which are difficult to process by conventional processing methods, also concern the progress and development of machines, especially the most common ones, such as extruders and injection moulding machines. The aim of the Special Issue is to collect current research and analyses concerning the properties and structure of new polymeric materials of various applications, with special emphasis on biodegradable materials, and to show the possibilities of applying optimisation methods in polymer processing, which can be confidently applied with very good results and without large computational effort. In the opinion of the authors, the presented collection of papers is a fragment of contemporary, interesting directions and development trends in polymer processing.

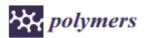
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Compatibilizzatori di copolimeri triblock per migliorare le proprietà meccaniche di un biopolimero rinnovabile.

Il poli(acido lattico) (PLA) è una plastica emergente che ha proprietà insufficienti (ad esempio, è troppo fragile) per un uso commerciale diffuso. Precedenti risultati di ricerca hanno dimostrato che la resistenza e la tenacità dei compositi PLA rinforzati con fibre di basalto (PLA / BF) devono ancora essere migliorate. Per affrontare questa limitazione, questo studio mirava a ottenere un compatibilizzante efficace per PLA / BF. La fusione-miscelazione di poli(butilene adipato-cotereftalato) (PBAT) con PLA in presenza di 4,4'-metilene difenil diisocianato (MDI: 0,5 wt% della resina totale) ha fornito copolimeri triblocco PLA/PBAT-MDI. I copolimeri triblocco sono stati miscelati fondenti per migliorare l'adesione interfacciale di PLA/BF e ottenere così ottime prestazioni dei polimeri PLA-ternari. Questo lavoro presenta la prima indagine sugli effetti dei copolimeri triblocco PLA/PBAT-MDI come compatibilizzanti per miscele PLA/BF.





Article

Triblock Copolymer Compatibilizers for Enhancing the Mechanical Properties of a Renewable Bio-Polymer

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Abstract: Poly(lactic acid) (PLA) is an emerging plastic that has insufficient properties (e.g., it is too brittle) for widespread commercial use. Previous research results have shown that the strength and toughness of basalt fiber reinforced PLA composites (PLA/BF) still need to be improved. To address this limitation, this study aimed to obtain an effective compatibilizer for PLA/BF. Melt-blending of poly(butylene adipate-co-terephthalate) (PBAT) with PLA in the presence of 4,4'-methylene diphenyl diisocyanate (MDI: 0.5 wt% of the total resin) afforded PLA/PBAT-MDI triblock copolymers. The triblock copolymers were melt-blended to improve the interfacial adhesion of PLA/BF and thus obtain excellent performance of the PLA-ternary polymers. This work presents the first investigation on the effects of PLA/PBAT-MDI triblock copolymers as compatibilizers for PLA/BF blends. The resultant mechanics, the morphology, interface, crystallinity, and thermal stability of the PLA-bio polymers were comprehensively examined via standard characterization techniques. The crystallinity of the PLA-ternary polymers was as high as 43.6%, 1.44× that of PLA/BF, and 163.5% higher than that of pure PLA. The stored energy of the PLA-ternary polymers reached 20,306.2 MPa, 5.5× than that of PLA/BF, and 18.6× of pure PLA. Moreover, the fatigue life of the PLA-ternary polymers was substantially improved, 5.85× than that of PLA/PBAT-MDI triblock copolymers. Thus, the PLA/PBAT-MDI triblock copolymers are compatibilizers that improve the mechanical properties of

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Keywords: triblock copolymer; compatibilization; bioplastic; reinforced composite; failure analysis

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Riciclo di materiali di imballaggio post-consumo in nuove applicazioni di imballaggio alimentare: Revisione Critica dell'Approccio Europeo e Prospettive Future

La strategia europea per la plastica, nell'ambito del piano d'azione dell'UE per l'economia circolare, dovrebbe sostenere la riduzione dei rifiuti di plastica. Un elemento chiave di questo piano d'azione è il miglioramento dell'economia e della qualità della plastica riciclata. Inoltre, un obiettivo importante è che entro il 2030 tutti gli imballaggi in plastica immessi sul mercato dell'UE debbano essere riutilizzabili o riciclabili in modo conveniente. Ciò significa che, alla fine, dovrebbe essere istituito un riciclo a circuito chiuso dei materiali di imballaggio alimentare. Tuttavia, l'uso di materiali riciclati non deve comportare una protezione preventiva meno severa dei consumatori dei materiali di imballaggio alimentare. L'obiettivo di questa rassegna è quello di fornire uno spaccato della valutazione dei materiali riciclati post-consumo applicati a diretto contatto con gli alimenti.





Review

Recycling of Post-Consumer Packaging Materials into New Food Packaging Applications—Critical Review of the European Approach and Future Perspectives

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Abstract: The European strategy for plastics, as part of the EU's circular economy action plan, should support the reduction in plastic waste. One key element in this action plan is the improvement of the economics and quality of recycled plastics. In addition, an important goal is that by 2030, all plastics packaging placed on the EU market must either be reusable or can be recycled in a cost-effective manner. This means that, at the end, a closed-loop recycling of food packaging materials should be established. However, the use of recyclates must not result in less severe preventive consumer protection of food packaging materials. This may lead to a conservative evaluation of authorities on post-consumer recyclates in food packaging applications. On the other hand, over-conservatism might over-protect the consumer and generate insurmountable barriers to the application of post-consumer recyclates for food packaging and, hence, counteract the targets of circular economy. The objective of this review is to provide an insight into the evaluation of post-consumer recyclates applied in direct contact to food. Safety assessment criteria as developed by the European Food Safety Authority EFSA will be presented, explained, and critically discussed.

Keywords: circular economy; recycling; packaging; migration; diffusion modelling; food safety evaluation; legal compliance

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Poli Cloro Bifenili (PCB) nell'ambiente: eventi occupazionali ed espositivi, effetti sulla salute umana e sulla fertilità

Nell'ultimo decennio circa, i bifenili policlorurati (PCB) hanno raccolto una rinnovata attenzione nella comunità scientifica a causa di nuove prove che indicano la loro continua presenza nell'ambiente e nei luoghi di lavoro e i potenziali rischi umani legati alla loro presenza. I PCB si spostano dall'ambiente all'uomo attraverso percorsi diversi; la via dominante è l'ingestione di alimenti contaminati (pesce, frutti di mare e latticini), seguita dall'inalazione (sia all'interno che all'esterno) e, in misura minore, dall'ingestione di polvere e dal contatto cutaneo. Le più alte contaminazioni da PCB sono state rilevate nei siti di riciclo dei rifiuti elettronici, suggerendo la necessità di attuare strategie di bonifica di tali aree inquinate per salvaguardare la salute dei lavoratori e delle popolazioni locali.





Review

Polychlorinated Biphenyls (PCBs) in the Environment: Occupational and Exposure Events, Effects on Human Health and Fertility

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Abstract: In the last decade or so, polychlorinated biphenyls (PCBs) garnered renewed attention in the scientific community due to new evidence pointing at their continued presence in the environment and workplaces and the potential human risks related to their presence. PCBs move



Citation: Montano, L.; Pironti, C.; Pinto, G.; Ricciardi, M.; Buono, A.; Brogna, C.; Venier, M.; Piscopo, M.; Amoresano, A.; Motta, O. Polychlorinated Biphenyls (PCBs) in the Environment: Occupational and

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