

Special Issue: Bio-based Packaging

Guest Editors: José M. Lagarón, Amparo López-Rubio, and María José Fabra
Institute of Agrochemistry and Food Technology of the Spanish Council for Scientific Research

EDITORIAL

Bio-based Packaging

J. M. Lagarón, A. López-Rubio and M. J. Fabra, *J. Appl. Polym. Sci.* 2015,
DOI: 10.1002/app.42971

REVIEWS

Active edible films: Current state and future trends

C. Mellinas, A. Valdés, M. Ramos, N. Burgos, M. D. C. Garrigós and A. Jiménez,
J. Appl. Polym. Sci. 2015, DOI: 10.1002/app.42631

Vegetal fiber-based biocomposites: Which stakes for food packaging applications?

M.-A. Berthet, H. Angellier-Coussy, V. Guillard and N. Gontard, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.42528

Enzymatic-assisted extraction and modification of lignocellulosic plant polysaccharides for packaging applications

A. Martínez-Abad, A. C. Ruthes and F. Vilaplana, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.42523

RESEARCH ARTICLES

Combining polyhydroxyalkanoates with nanokeratin to develop novel biopackaging structures

M. J. Fabra, P. Pardo, M. Martínez-Sanz, A. Lopez-Rubio and J. M. Lagarón, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.42695

Production of bacterial nanobiocomposites of polyhydroxyalkanoates derived from waste and bacterial nanocellulose by the electrospinning enabling melt compounding method

M. Martínez-Sanz, A. Lopez-Rubio, M. Villano, C. S. S. Oliveira, M. Majone, M. Reis and J. M. Lagarón, *J. Appl. Polym. Sci.* 2015,
DOI: 10.1002/app.42486

Bio-based multilayer barrier films by extrusion, dispersion coating and atomic layer deposition

J. Vartiainen, Y. Shen, T. Kaljunen, T. Malm, M. Vähä-Nissi, M. Putkonen and A. Harlin, *J. Appl. Polym. Sci.* 2015,
DOI: 10.1002/app.42260

Film blowing of PHBV blends and PHBV-based multilayers for the production of biodegradable packages

M. Cunha, B. Fernandes, J. A. Covas, A. A. Vicente and L. Hilliou, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.42165

On the use of tris(nonylphenyl) phosphite as a chain extender in melt-blended poly(hydroxybutyrate-co-hydroxyvalerate)/clay nanocomposites: Morphology, thermal stability, and mechanical properties

J. González-Ausejo, E. Sánchez-Safont, J. Gámez-Pérez and L. Cabedo, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.42390

Characterization of polyhydroxyalkanoate blends incorporating unpurified biosustainably produced poly(3-hydroxybutyrate-co-3-hydroxyvalerate)

A. Martínez-Abad, L. Cabedo, C. S. S. Oliveira, L. Hilliou, M. Reis and J. M. Lagarón, *J. Appl. Polym. Sci.* 2015,
DOI: 10.1002/app.42633

Modification of poly(3-hydroxybutyrate-co-3-hydroxyvalerate) properties by reactive blending with a monoterpene derivative

L. Pilon and C. Kelly, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.42588

Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) films for food packaging: Physical-chemical and structural stability under food contact conditions

V. Chea, H. Angellier-Coussy, S. Peyron, D. Kemmer and N. Gontard, *J. Appl. Polym. Sci.* 2015, DOI: 10.1002/app.41850



Special Issue: Bio-based Packaging

Guest Editors: José M. Lagarón, Amparo López-Rubio, and María José Fabra
Institute of Agrochemistry and Food Technology of the Spanish Council for Scientific Research

Impact of fermentation residues on the thermal, structural, and rheological properties of polyhydroxy(butyrate-co-valerate) produced from cheese whey and olive oil mill wastewater
L. Hilliou, D. Machado, C. S. S. Oliveira, A. R. Gouveia, M. A. M. Reis, S. Campanari, M. Villano and M. Majone, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42818](https://doi.org/10.1002/app.42818)

Synergistic effect of lactic acid oligomers and laminar graphene sheets on the barrier properties of polylactide nanocomposites obtained by the in situ polymerization pre-incorporation method

J. Ambrosio-Martín, A. López-Rubio, M. J. Fabra, M. A. López-Manchado, A. Sorrentino, G. Gorrasi and J. M. Lagarón, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42661](https://doi.org/10.1002/app.42661)

Antibacterial poly(lactic acid) (PLA) films grafted with electrospun PLA/allyl isothiocyanate fibers for food packaging

H. H. Kara, F. Xiao, M. Sarker, T. Z. Jin, A. M. M. Sousa, C.-K. Liu, P. M. Tomasula and L. Liu, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42475](https://doi.org/10.1002/app.42475)

Poly(L-lactide)/ZnO nanocomposites as efficient UV-shielding coatings for packaging applications

E. Lizundia, L. Ruiz-Rubio, J. L. Vilas and L. M. León, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42426](https://doi.org/10.1002/app.42426)

Effect of electron beam irradiation on the properties of polylactic acid/montmorillonite nanocomposites for food packaging applications

M. Salvatore, A. Marra, D. Duraccio, S. Shayanfar, S. D. Pillai, S. Cimmino and C. Silvestre, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42219](https://doi.org/10.1002/app.42219)

Preparation and characterization of linear and star-shaped poly L-lactide blends

M. B. Khajeheian and A. Rosling, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42231](https://doi.org/10.1002/app.42231)

Mechanical properties of biodegradable polylactide/poly(ether-block-amide)/thermoplastic starch blends: Effect of the crosslinking of starch

L. Zhou, G. Zhao and W. Jiang, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42297](https://doi.org/10.1002/app.42297)

Interaction and quantification of thymol in active PLA-based materials containing natural fibers

I. S. M. A. Tawakkal, M. J. Cran and S. W. Bigger, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42160](https://doi.org/10.1002/app.42160)

Graphene-modified poly(lactic acid) for packaging: Material formulation, processing, and performance

M. Barletta, M. Puopolo, V. Tagliaferri and S. Vesco, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42252](https://doi.org/10.1002/app.42252)

Edible films based on chia flour: Development and characterization

M. Dick, C. H. Pagno, T. M. H. Costa, A. Gomaa, M. Subirade, A. De O. Rios and S. H. Flóres, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42455](https://doi.org/10.1002/app.42455)

Influence of citric acid on the properties and stability of starch-polycaprolactone based films

R. Ortega-Toro, S. Collazo-Bigliardi, P. Talens and A. Chiralt, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42220](https://doi.org/10.1002/app.42220)

Bionanocomposites based on polysaccharides and fibrous clays for packaging applications

A. C. S. Alcântara, M. Darder, P. Aranda, A. Ayral and E. Ruiz-Hitzky, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42362](https://doi.org/10.1002/app.42362)

Hybrid carrageenan-based formulations for edible film preparation: Benchmarking with kappa carrageenan

F. D. S. Larotonda, M. D. Torres, M. P. Gonçalves, A. M. Sereno and L. Hilliou, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42263](https://doi.org/10.1002/app.42263)



Special Issue: Bio-based Packaging

Guest Editors: José M. Lagarón, Amparo López-Rubio, and María José Fabra
Institute of Agrochemistry and Food Technology of the Spanish Council for Scientific Research

Structural and mechanical properties of clay nanocomposite foams based on cellulose for the food packaging industry

S. Ahmadzadeh, J. Keramat, A. Nasirpour, N. Hamdami, T. Behzad, L. Aranda, M. Vilasi and S. Desobry, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42079](https://doi.org/10.1002/app.42079)

Mechanically strong nanocomposite films based on highly filled carboxymethyl cellulose with graphene oxide

M. El Achaby, N. El Miri, A. Snik, M. Zahouily, K. Abdelouahdi, A. Fihri, A. Barakat and A. Solhy, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42356](https://doi.org/10.1002/app.42356)

Production and characterization of microfibrillated cellulose-reinforced thermoplastic starch composites

L. Lendvai, J. Karger-Kocsis, Á. Kmetty and S. X. Drakopoulos, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42397](https://doi.org/10.1002/app.42397)

Development of bioplastics based on agricultural side-stream products: Film extrusion of *Crambe abyssinica*/wheat gluten blends for packaging purposes

H. Rasel, T. Johansson, M. Gällstedt, W. Newson, E. Johansson and M. Hedenqvist, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42442](https://doi.org/10.1002/app.42442)

Influence of plasticizers on the mechanical and barrier properties of cast biopolymer films

V. Jost and C. Stramm, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42513](https://doi.org/10.1002/app.42513)

The effect of oxidized ferulic acid on physicochemical properties of bitter vetch (*Vicia ervilia*) protein-based films

A. Arabestani, M. Kadivar, M. Shahedi, S. A. H. Goli and R. Porta, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42894](https://doi.org/10.1002/app.42894)

Effect of hydrochloric acid on the properties of biodegradable packaging materials of carboxymethylcellulose/poly(vinyl alcohol) blends

M. D. H. Rashid, M. D. S. Rahaman, S. E. Kabir and M. A. Khan, *J. Appl. Polym. Sci.* 2015, DOI: [10.1002/app.42870](https://doi.org/10.1002/app.42870)



Bio-based Packaging

Polymers have grown to be the preferred materials for packaging over the last few decades, and packaging is the largest consumption application of polymeric materials. The use of polymers for packaging is, however, accompanied by waste management, and water and carbon footprint issues that have initiated the current trend of substituting petroleum-based plastics with renewable bioderived plastics. The aim of this substitution is to eradicate any negative environmental impact of the use of the materials required for such a demanding application. This trend is reflected by the growing number of works appearing in the literature every year in relation to the fabrication and characterization of novel biopolymers and biocomposites, and the development of processing strategies designed to overcome the inherent limitations of these bio-based materials.

This special issue on Bio-based Packaging gathers together a significant number of articles in which the latest developments in the field are widely covered. These articles show strategies to improve the performance and processing of biopolyesters, proteins and polysaccharides for use in packaging applications. In particular, the issue highlights the immense interest that the scientific community currently has in microbial polyhydroxyalkanoates. This biopolyester shows the greatest potential for bio-based packaging materials because it is more readily biodegradable and has better barrier properties than the most well-known biopolyester benchmark, the polylactide family.

The application of nanofillers to tailor the properties of biopolymers continues to be one of the most relevant research topics for polymer reinforcement. Here, the use of nanobiofillers and new processing strategies could help to overcome some of the hurdles that currently prevent these materials from being practical on a large scale.

Overall, research efforts are clearly intent on addressing the immediate issues and challenges inhibiting the use of biopolymers in packaging, including cost reduction, enhanced safety, the valorization of byproducts, the discovery of new bio-based sources, the balancing of physical properties, and improved processability.

José M. Lagarón
Editorial Board, *Journal of Applied Polymer Science*
Amparo López-Rubio
María José Fabra
Institute of Agrochemistry and
Food Technology (IATA)
Spanish Council for Scientific Research (CSIC)
Valencia, Spain