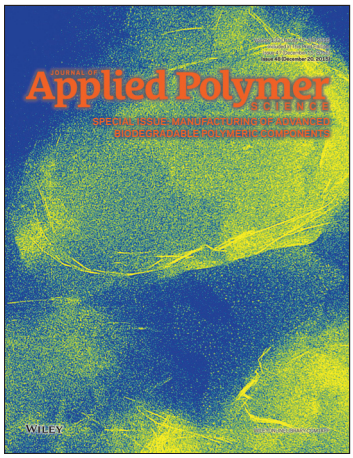
JOURNAL OF Applied Polymer SCIENCE

Special Issue: Manufacturing of Advanced Biodegradable Polymeric Components

Guest Editors: Prof. Roberto Pantani (University of Salerno) and
Prof. Lih-Sheng Turng (University of Wisconsin–Madison)



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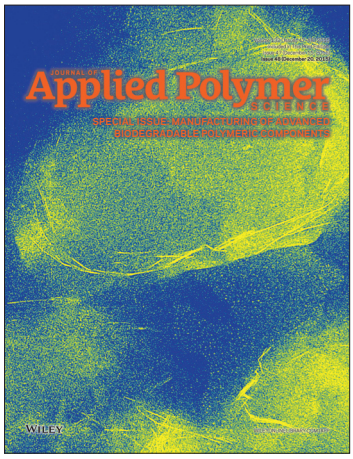

Rotational molding of biodegradable composites obtained with PLA reinforced by the wooden backbone of opuntia ficus indica cladodes
A. Greco and A. Maffezzoli, *J. Appl. Polym. Sci.* 2015, **DOI:** 10.1002/app.42447

Foam injection molding of poly(lactic) acid: Effect of back pressure on morphology and mechanical properties
V. Volpe and R. Pantani, *J. Appl. Polym. Sci.* 2015, **DOI:** 10.1002/app.42612

Modification and extrusion coating of polylactic acid films
H.-Y. Cheng, Y.-J. Yang, S.-C. Li, J.-Y. Hong and G.-W. Jang, *J. Appl. Polym. Sci.* 2015, **DOI:** 10.1002/app.42472

Processing and properties of biodegradable compounds based on aliphatic polyesters
M. R. Nobile, P. Cerruti, M. Malinconico and R. Pantani, *J. Appl. Polym. Sci.* 2015, **DOI:** 10.1002/app.42481

Journal of Applied Polymer Science

EDITORIAL

Manufacturing of advanced biodegradable polymeric components

The growing interest in biodegradable plastic materials relies on several factors. There are rising environmental concerns, both from customers who are increasingly willing to pay higher prices for green products, and from legislators who drive polymer industries to seek more environmental friendly materials. There is also a quest to use raw materials that do not deplete our limited fossil resources.

Unfortunately, the success of biodegradable polymers has been limited by at least as many factors. Above all, their properties are inferior to their non-degradable counterparts. They are also extremely sensitive to how they are stored, processed, and used. Indeed, the production of biodegradable polymer parts requires not only finding a plastic with suitable properties, but also the considerable work of tuning the processing conditions to minimize any loss of these properties.

Fortunately, research is quickly advancing in the direction of improving the characteristics and processing capabilities of biodegradable polymers. In some cases, for example tissue engineering, new processes are being developed and refined on the basis of the properties of biodegradable polymers. The results of these studies are now finding their way into industrial use.

Consisting of three reviews and several primary research articles, this special issue on Manufacturing of Advanced Biodegradable Polymeric Components showcases the wide range of strategies that have been used to optimize processes and/or materials to obtain biodegradable components with enhanced properties and performance.

The first review addresses the heat resistance of biodegradable polymers. This is a classical issue that hinders the use of these materials in many important industrial applications, such as hot food containers, electronic device housings and automotive parts. The second review deals with the most recent advances and emerging technologies in food-packaging applications of biodegradable plastics from renewable sources—traditionally one of the largest sectors in which this class of materials is used. The third review summarizes the latest developments in the bioprinting of biodegradable hydrogels for tissue engineering, a frontier application of biodegradable polymers.

The research papers deal with additives—plasticizers, chain extenders—and fillers (both conventional such as talc or ZnO, and newer ones like short cellulose nanofibrils or lignin–cellulose fibers), as well as blends of several biodegradable polymers. All of these have been adopted to improve specific engineering properties: processability, mechanical properties, rheological properties, degradation rate. One common feature is the application and tuning of technologies that can be scaled-up for industrial applications, from the melt compounding adopted to obtain the studied materials, to the processing technologies used—extrusion, injection molding, film casting, rotational molding—to produce the final parts.

Through studying specific compounds, the research papers provide a comprehensive state-of-the-art picture of the properties of biodegradable polymers and their processability across a variety of processing technologies.

We hope that this special issue will help stimulate ideas among researchers intending to develop new materials to be used to manufacture plastic products with new or desirable properties that have the ability to be fully compostable at the end of their service life.

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