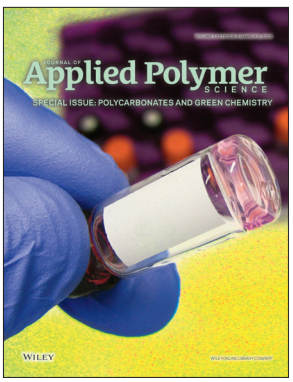
JOURNAL OF Applied Polymer SCIENCE

Special Issue: Polycarbonates and Green Chemistry

Guest Editors: Dr Sophie Guillaume (Université de Rennes 1) and Dr Laetitia Mespouille (University of Mons)



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S. Guillaume and L. Mespouille, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.40081**

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Porous crystals as active catalysts for the synthesis of cyclic carbonates
M. Zhu and M. A. Carreon, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39738**

Renaissance of aliphatic polycarbonates: New techniques and biomedical applications
J. Xu, E. Feng and J. Song, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39822**

RESEARCH ARTICLES

Chemical modification of bisphenol A polycarbonate by reactive blending with ethylene carbonate
M. Colonna, C. Berti and M. Fiorini, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39820**

Synthesis and characterization of poly(ester carbonate)s by melt-phase interchange reactions of dihydroxy compounds with alkylene and arylene diphenyl dicarbonates containing ester groups
B. A. Sweileh, H. R. Al-Qalawi and H. A. Mohammad, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39904**

Terpolymerization of benzyl glycidyl ether, propylene oxide, and CO_2 using binary and bifunctional [rac-SalcyCo^{III}X] complexes and the thermal and mechanical properties of the resultant poly(benzyl 1,2-glycerol-co-propylene carbonate)s and poly(1,2-glycerol-co-propylene carbonate)s
H. Zhang and M. W. Grinstaff, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39893**

Synthesis of biodegradable high molecular weight polycarbonates from 1,3-trimethylene carbonate and 2,2-dimethyltrimethylene carbonate
M. Pastusiak, P. Dobrzynski, J. Kasperczyk, A. Smola and H. Janecze, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.40037**

Propylene carbonate as a source of carbonate units in the synthesis of elastomeric poly(carbonate–urethane)s and poly(ester–carbonate–urethane)s
M. M. Mazurek, P. G. Parzuchowski and G. Rokicki, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39764**

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J. Wang, L. Zheng, C. Li, W. Zhu, D. Zhang, G. Guan and Y. Xiao, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39158**

Effect of interfacial tension on the cell structure of poly(methyl methacrylate)/bisphenol A polycarbonate blends foamed with CO_2
P. Gong and M. Ohshima, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39228**

Flame retardancy and thermal properties of carboxyl-containing polysiloxane derivatives in polycarbonate
R. Song, L. Chang and B. Li, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39814**

Clay-induced degradation during the melt reprocessing of waste polycarbonate
M. U. de la Orden, D. P. C. Muñoz, V. Lorenzo and J. M. Urreaga, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39997**

Preparation and properties of polycarbonate microspheres containing tetanus toxoid vaccine
B. Hu, X.-J. Ke, G.-P. Yan, R.-X. Zhuo, Y. Wu, C.-L. Fan and Y.-J. Liu, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.40048**

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X. J. Loh, H. X. Gan, H. Wang, S. J. E. Tan, K. Y. Neoh, S. S. J. Tan, H. F. Diong, J. J. Kim, W. L. S. Lee, X. Fang, O. Cally, S. S. Yap, K. P. Liong and K. H. Chan, *J. Appl. Polym. Sci.* 2014, **DOI: 10.1002/app.39924**

JOURNAL OF Applied Polymer SCIENCE

EDITORIAL

Polycarbonates and Green Chemistry

Welcome to this special issue of the *Journal of Applied Polymer Science*, in the area of Polycarbonates and Green Chemistry.

Since their discovery in the 1930s by Wallace Carothers at DuPont (Carothers, W. H.; Van Natta, F. J. *J. Am. Chem. Soc.* **1930**, *52*, 314-6), and with the synthesis of bisphenol-A polycarbonate in the 1950s, polycarbonates in their diversity have gained growing industrial and academic interest.

Polycarbonates can be classified into two families based on their structural composition: aromatic polycarbonates and aliphatic polycarbonates. The former has been widely developed industrially for 60 years, owing to the unique and attractive processing and physical properties including, in particular, temperature and impact resistance as well as optical transparency. These make the polycarbonates desirable not only for use in everyday applications but also for engineering plastics used in the automotive industry, as components of aircraft, as electronics, for data storage, in construction and as biomedical materials. The latter family has gained an explosive burst of interest over the past two decades, particularly as soft materials for biomedical applications; principally because aliphatic polycarbonates bring together the important features of biocompatibility, biodegradability, and, significantly, mechanical properties close to living tissues. Within the general context of green chemistry and environmental considerations, efforts are currently aimed at designing original polycarbonates upon polycondensation, copolymerization of epoxide with CO_2, copolymerization with a second monomer by ring-opening polymerization (ROP), or upon blending. Research on polycarbonates is thus nowadays an actively moving field as highlighted by these topics which are covered in the articles within the present issue.

This special issue encompasses a range of new developments as well as two review articles addressing key aspects of the different techniques of the synthesis of cyclic carbonates and of their polymerization, along with their applications in the biomedical domain. Through representative examples, the first review describes aspects of the fundamental structure–catalysis relationships of microporous crystals, such as zeolites and metal organic frameworks, and ordered mesoporous phases with highly desirable properties, in the conversion of CO_2 into cyclic carbonates. Recent progress in the ROP techniques for preparing well-defined functional polycarbonates and the new applications of polycarbonates, especially as hydrogels or drug-delivery carriers, are next reviewed. The chemical modification of bisphenol-A polycarbonate, the synthesis of copolymers of polycarbonates by melt-phase interchange, polycondensation, ROP or CO_2–epoxide copolymerization, as well as the synthesis of polycarbonate-based polyurethanes, and the cell structure, thermal, or degradation properties of some polycarbonate blends, are covered in the following articles. The issue finishes with some illustrative biomedical applications of polycarbonates as micropsheres for the delivery of tetanus toxoid vaccine, and as ophthalmic thermogelling delivery agents for the treatment of eye infections. In light of these recent works on polycarbonates gathered in the present special issue, research in this field thus appears in its infancy and prone to further development.

Finally, as Guest Editors, we both would like to thank all of the contributors for joining us in this endeavour and for submitting their new research and reviews to the *Journal of Applied Polymer Science*. We would also like to extend our thanks to Hilary Crichton and Stefano Tonzani for their hard work and typical professionalism in handling all the manuscripts of this special issue. This special issue would not have been possible without their collective input.

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