

论文

官能团化己内酯与丙交酯无规共聚物的合成与降解性能

戴炜枫¹, 杜征臻¹, 何月英¹, 郎美东^{1,2}

1. 华东理工大学材料科学与工程学院, 超细材料制备与应用教育部重点实验室, 上海 200237;
2. 复旦大学聚合物分子工程教育部重点实验室, 上海 200433

摘要:

研究了官能团化新型己内酯单体的合成及其与丙交酯无规共聚物的降解性能. 首先, 环己酮和N-异丙基丙烯酰胺通过Michael加成反应合成了2-(N-异丙基酰胺乙烯基)-环己酮; 然后, 以间氯过氧化苯甲酸为氧化剂, 通过Baeyer-Villiger氧化反应, 制备带有酰胺官能团的己内酯单体6-(N-异丙基酰胺乙烯基)- ϵ -己内酯; 最后, 在异辛酸亚锡[Sn(Oct)₂]的催化下与丙交酯开环聚合, 得到新型己内酯与丙交酯的无规共聚物. 采用¹H NMR, SEC和DSC表征了聚合物的结构和热力学性能. 同时通过黏度法、失重法和SEM对该聚合物的降解性能进行了表征. 结果表明, 该共聚物的降解速率明显增快, 材料降解2个月后, 材料的质量损失达到28.1%, 特性黏度降低近40%.

关键词: 聚己内酯; 聚丙交酯; 侧基官能团; 生物可降解材料; 无规共聚物

Synthesis, Characterization and Degradability of P(LA-co-ACL) Copolymer Bearing Pendant N-Substituted Acylamine Group

DAI Wei-Feng¹, DU Zheng-Zhen¹, HE Yue-Ying¹, LANG Mei-Dong^{1,2*}

1. Key Laboratory for Ultrafine Materials, Ministry of Education, School of Materials Science and Engineering, East China University of Science and Technology, Shanghai 200237, China;
2. Key Laboratory of Molecular Engineering of Polymers, Ministry of Education, Fudan University, Shanghai 200433, China

Abstract:

The synthesis, characterization and polymerization of a new cyclic 6-(N-isopropyl acylamine ethylidene)- ϵ -caprolactone(ACL) were reported. α -Substituted cyclohexanone was synthesized by Michael reaction of N-isopropylacrylamide and cyclohexanone. Then it was subsequently converted into ACL by the Baeyer-Villiger oxidation reaction using of 3-chloroperoxybenzoic acid(m-CPBA) as the oxidant. This new lactone was copolymerized with various contents of L-LA by bulk ring-opening polymerization(ROP) initiated by Sn(Oct)₂. All the copolymers were characterized by ¹H NMR, SEC and DSC. The copolymer formed flexible films and was used to study its degradability. A phosphate buffer (pH=7.4) with temperature 37 °C was adopted to proceed the degrading study all through. The hydrolytic degradation of P(LA-co-ACL) was much faster, which is confirmed by the mass loss and change of intrinsic viscosity.

Keywords: Poly(ϵ -caprolactone); Poly(L-lactide); Pendant group; Biodegradable material; Random copolymer

收稿日期 2009-03-30 修回日期 网络版发布日期

DOI:

基金项目:

国家自然科学基金(批准号: 20374013, 20674019)、教育部博士点基金(批准号: 20060251015)、上海市曙光计划及上海市重点学科建设项目(批准号: B502)资助.

通讯作者: 郎美东, 男, 博士, 教授, 博士生导师, 主要从事生物材料的研究. E-mail: mdlang@ecust.edu.cn

作者简介:

参考文献:

扩展功能

本文信息

Supporting info

PDF(549KB)

[HTML全文]

[\({article.html_WenJianDaXiao}.KB\)](#)

参考文献[PDF]

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

聚己内酯; 聚丙交酯; 侧基官能团; 生物可降解材料; 无规共聚物

本文作者相关文章

PubMed

[1]Langer R.. Acc. Chem. Res.
[J], 2000, 33: 94—101

[2]Langer R., David A.. Nature
[J], 2004, 428: 487—492

[3]Lavik E., Langer R.. Appl. Microbiol. Biotechnol.
[J], 2004, 65: 1—8

[4]Andronova N., Srivastava R. K., Albertsson A. C.. Polymer
[J], 2005, 46: 6746—6755

[5]Cohn D., Salomon A. H.. Biomaterials
[J], 2005, 26: 2297—2305

[6]Pitt C. G.. Poly-ε-caprolactone and Its Copolymers, in Biodegradable Polymer as Drug Delivery Systems
[M], New York: Marcel Dekker, 1990: 71

[7]Lang M. D., Bei J. Z., Wang S. G.. J. Biomaier Sci. Polymer Edn.
[J], 1999, 10: 501—512

[8]Schmitt E. E., Suen T. J., Updegraff I. H.. Water-degradable Resins Containing Recurring, Contiguous, Polymerized Glycolide Units and Process for Preparing Same, US 3784585
[P], 1974

[9]Schindler A.. Contemporary Topics in Polymer Science, Vol.2
[M], New York: Plenum, 1977: 251—286

[10]Song C. X., Sun H. F., Feng X. D.. Polymer J.
[J], 1987, 19: 485—491

[11]DAI Wei-Feng(戴炜枫), RU Min-Liang(茹敏良), HE Yue-Ying(何月英), et al.. Chinese Polymer Bulletin (高分子通报)
[J], 2008, 9: 1—10

[12]Trollss M., Kelly M. A., Claesson H., et al.. Macromolecules
[J], 1999, 32: 4917—4924

[13]Tian D., Halleux O., Dubois P., et al.. Macromolecules
[J], 1998, 31: 924—927

[14]Tian D., Dubois P., Jérme R.. Macromolecules
[J], 1997, 30: 2575—2581

[15]Latere J. P., Lecomte P., Dubois P. J., et al.. Macromolecules
[J], 2002, 35: 7857—7859

[16]Gabelnick H. L.. Adavances in Human Fertility and Reproductive Endocrinology, Vol.2, Long Acting Steroid Contraception
[M], New York: Raven Press, 1983: 149

本刊中的类似文章

文章评论

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text"/> 1308

