

[1] 吕莉, 丁晓慧, 林国良. 聚乳酸乙醇酸的固相聚合研究[J]. 厦门大学学报(自然科学版), 2013, 52(05): 655. [doi:10.6043/j.issn.0438-0479.2013.05.014]

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## 聚乳酸乙醇酸的固相聚合研究(PDF) 分享到:

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**Title:** Study on the Synthesis of Copoly(lactic acid-co-glycolic acid) by Solid-state Polymerization

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**关键词:** 聚乳酸乙醇酸(PLGA); 无催化剂; 固相聚合

**Keywords:** poly(lactic acid-co-glycolic acid)(PLGA); not catalysts; solid-state polymerization

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**摘要:** 为了制备安全、经济且能满足生物医学工程材料要求的聚乳酸乙醇酸(PLGA),以乙醇酸(GA)和外消旋乳酸(LA)为原料,在无催化剂条件下熔融聚合制备低聚物,而后引入固相聚合合成PLGA.采用红外光谱、黏度法、X射线衍射、差示扫描量热对产物进行表征,探讨了固相聚合条件对PLGA结构的影响.结果表明,固相聚合明显提高了聚合物的分子质量,分段控温聚合更有利于聚合物分子质量的提高,可使PLGA的分子质量提高到固相聚合反应前的2.46倍.低聚物在压力0.001 MPa条件下,先后经过135 °C/4 h,160 °C/8 h,165 °C/20 h固相聚合后,其分子质量可达到 $9.34 \times 10^4$  u.在一定时间内,随着反应的进行,聚合物的分子质量不断提高,其熔点也随着固相时间的延长而增大.

**Abstract:** The object of this study is to synthesize poly(lactic acid-co-glycolic acid)(PLGA) which is safe, economical and can meet the requirements of biomedical engineering material. Starting from a mixture of glycolic acid(GA) and lactic acid(LA), PLGA was synthesized through direct melt polycondensation without catalysts, the condition of solid-state polymerization were especially studied. The products were characterized by FTIR, Ubbelohde viscosity method, X-ray diffraction(XRD) and differential scanning calorimetry(DSC). Effects of the conditions of solid-state polymerization on structure of product were discussed. The results showed that the viscosity-average molecular weight( $M_{\eta}$ ) of PLGA was significantly improved, and the  $M_{\eta}$  of PLGA with different temperature controlling was much higher, the result demonstrated that the  $M_{\eta}$  of PLGA could be 2.46 times as large as that of PLGA without the solid-state

polycondensation. When PLGA was synthesized at the reaction for 4 h at 135 °C, 8 h at 160 °C, finally 20 h at 165 °C, the  $M_n$  of PLGA could reach to  $9.34 \times 10^4$  u. In a certain period of time, the  $M_n$  and melting point of PLGA increased as the reaction time increased.

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