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• 中文關鍵字	聚乳酸; 光彈檢測法; 結晶性; 熱性質; 彎曲模		
• 英文關鍵字	PLA; Photoelastic analysis; Crystallnility; Annealing; Bending modulus		
• 中文摘要	生物可吸收性高分子材在植入人體後，隨著組織的修，其會慢慢的解成小分子被人體吸收進而隨著身體代謝排出體外，具有如好的生物相容性、合適的堅硬、生物可吸收可代謝性，且無需第二次手術移除等優點。因此近可吸收高分子材的開發應用，使骨內固定裝置 發生質上的進步和轉變，而聚乳酸 (PLA)又是其中最受矚目的材之一。然而，目前的研究多針對於如何對生物可吸收性聚乳酸高分子施以同加工條件。對於所合成之高分子，能否有一樣、非破壞性且能確反應出所合成之高分子性質的檢測工具，以作爲高分子合成時品質的即時監控。這方面的研究至今仍未獲得一清楚的解。光彈檢測可用偵測物品內應態，且爲非破壞性檢測，對於床所使用的材在應分布分面的研究上有其優越性，已廣泛的應用於牙醫學研究中。因此本研究以改變聚乳酸製程時加熱溫與加熱時間爲控制變因，將光彈檢測所觀測之現象，與聚乳酸基本材性質之分子、結晶、機械強等相互比較，評估以光彈檢測作爲聚乳酸品質監控的可性，經實驗發現當聚乳酸製程改變時，光彈檢測下所反映出內應條紋分布態變化情形與聚乳酸高分子之基本性質如分子、結晶等改變的趨勢均相似。因此進一步研究後，用光彈檢測找出聚乳酸之最佳製程條件，以及消除應之方法，提高製成品強是可預期的。並可在未將光彈檢測非接觸、非破壞性的特性，作爲生產線上產品之品質管制 (QC)的最佳工具之一。		
• 英文摘要	Thermal degradable polymer (e.g. polylactic acid) is characterized by its photo-elasticity. During the polymerization process, its crystallization and mechanical properties are critically affected by temperature, pressure and other processing condition. Whether the magnitude and location of the residual stress inside a polymer are also affected by the processing conditions is unclear. This study		

used polymerization of lactic acid into #20 (pure PLLA) and #30 (95% PLLA and 5% PDLA) under different processing conditions (e.g. heating temperature, heating time) as experimental model. Photoelastic analysis apparatus, MTS, were used to examine the distribution of residual stress inside the polymerized product and its relationship with the breaking point; X-ray diffractometer and Gel Permeation Chromatography were used to examine the relationship between crystallization, molecular weight and distribution of residual stress. The results showed a non-linear log regression in stress (i.e. no. of fringe order) of #20 and #30 under different processing temperature. The fringe order in #20 was gradually reduced with the processing temperature increasing from 170.degree.C to 190.degree.C, indicating a degradation of PLLA and a reduction of internal stress under higher temperature. The stress in #30 was however the lowest at a processing temperature of 160.degree.C when the temperature was increased from 150.degree.C to 170.degree.C . These results suggest that photoelastic analysis is a convenient and non-invasive technique that can be used to accurately examine the internal stress of a polymer product. It can be used as an important indication for the best processing procedure for polymer injection processes and quality control of the products.