幾丁質奈米纖維之製備與應用

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三、幾丁質奈米晶體與纖維素奈米纖維之複合薄膜

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摘要

幾丁質是一種多功能、對環境友善的現代材料，具有奈米尺寸纖維型態及優異材料性質的生物聚合物。將幾丁質原料製備成幾丁質奈米纖維後，增加許多優異的特性，如尺寸小、高表面積體積比、高機械強度、高水分散性、高黏度、低密度、低熱膨脹率、傷口癒合特性等。因此，幾丁質奈米纖維具有很大的應用潛力。幾丁質奈米纖維具有抗真菌活性 (*Aspergillus*) 和可應用於薄膜及幫助傷口癒合。本研究以動態高壓均質法製備幾丁質奈米纖維並探討其特性，如直徑、形態、抗真菌活性等，結果顯示幾丁質奈米纖維隨著動態高壓均質處理時間增加，幾丁質由纖維聚集束轉變為結構均勻、一致性之奈米纖維，直徑 10-20 nm 與高長徑比，其化學與晶體型態無變化，也沒有發生去乙醯化，然而 $C.I._{110}$ 結晶度與抑菌率有上升趨勢，熱穩定性下降。幾丁質以超音波處理之幾丁質奈米晶體與纖維素奈米纖維製備複合薄膜，製備幾丁質奈米晶體與纖維素奈米纖維各不同比例組成之薄膜；其薄膜之拉應力、張力、楊氏模數、真菌存活率隨著幾丁質比例愈高而降低；在抗真菌活性方面，奈米纖維比纖維有較大的表面積，增加抑菌效果。幾丁質奈米纖維與 SSQ-UA 共聚物形成複合膜，結果顯示幾丁質奈米纖維添加會提高複合膜之楊氏模數與張力強度，而降低熱膨脹率，能應用於增強填料，作為高性能奈米複合材料。綜合上述，幾丁質經動態高壓均質法製備幾丁質奈米纖維、以超音波處理之幾丁質奈米晶體與纖維素奈米纖維製備複合薄膜、幾丁質奈米纖維會強化 SSQ-UA 共聚物薄膜，因此，幾丁質奈米纖維具有很大的應用潛力。

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