

# 治療過敏性皮炎的中草藥膠囊智能服裝

## Smart Garment with TCHM Microcapsules for Treating Atopic Dermatitis

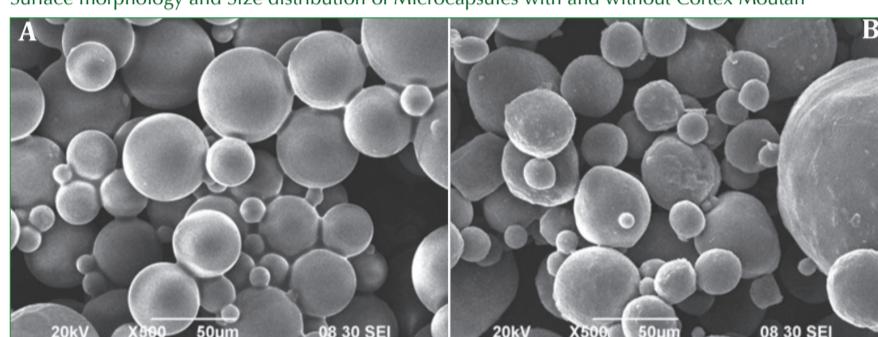
### 用於治療過敏性皮炎的牡丹皮微膠囊及其制備方法和應用

Non-toxic encapsulation technology to prepare Cortex Moutan microcapsules with the ability of controlled-release

一直以來，治療過敏性皮炎的方法是患者需要直接接觸中草藥，但這種方法卻會使他們感到不舒服，而且無法控制其釋放，因而影響其治療成效。有見及此，我們研發一種用來治療過敏性皮炎的牡丹皮微膠囊，它的製作方法是無毒性且其藥性釋放能被控制。同時，我們成功地使用兩個變量-溫度和濕度，以控制中草藥從微膠囊釋放到人體皮膚上的治療用途。應用此中草藥膠囊於特選的布料上製造智能服裝，能夠為過敏性皮炎患者提供一個舒適、高效的治療方案。

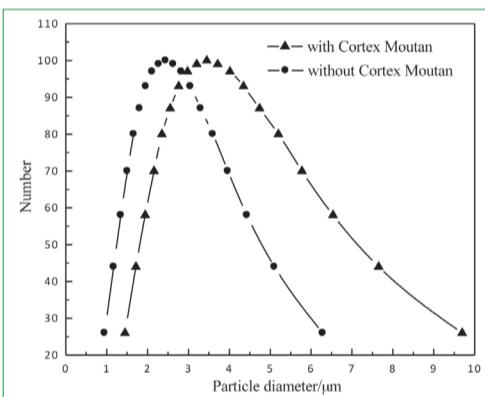
空微膠囊與含有牡丹皮微膠囊的表面形貌和尺寸分

Surface morphology and Size distribution of Microcapsules with and without Cortex Moutan

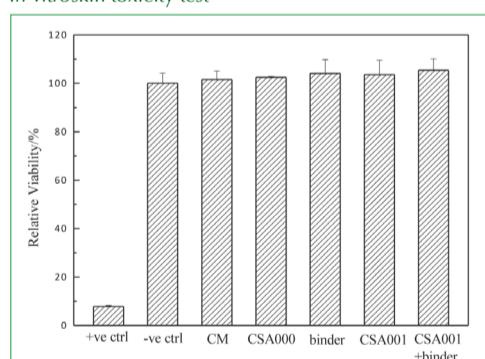


SEM照片(A)最佳狀態下的空白殼聚醣微膠囊；及(B)最佳狀態下的含牡丹皮微膠囊  
SEM micrographs of (A) blank chitosan microcapsules prepared under optimum condition without Cortex Moutan; and (B) microcapsules prepared under optimum condition with Cortex Moutan

微膠囊的粒子尺寸分佈圖  
Particle size distribution of CSA microcapsules with and without Cortex Moutan



皮膚毒性測試  
In vitro skin toxicity test



不同的樣品對細胞活力的影響±SD (n = 4)  
Effect of different samples on cell viability (CM, CSA000 and CSA001 represent Cortex Moutan, blank CSA and CM-loaded CSA respectively). Values represent mean ± SD (n = 4)

In the past, the traditional method of applying Traditional Chinese Herbal Medicine (TCHM) is direct contact for clinical treatment but this method makes patients uncomfortable and the release of TCHM could not be controlled for effective treatment. Thus, a new method is developed to prepare Chitosan/Sodium Alginate microcapsule encapsulated with TCHM for effective clinical treatment without toxicity effect, and with the ability of controlled-release using emulsion-chemical cross-linking method with L<sub>9</sub>(3<sup>4</sup>) orthogonal array analysis. The TCHM microcapsules are grafted on special textile materials to develop smart garment for more convenient and effective curing of patients with atopic dermatitis.

#### Principal Investigator

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Note: Subject to data charges by mobile operators

專利申請編號及國家: 201210369537.6 (中國)

#### 特色與優點

- 製作一個用來盛載中草藥的無毒性微膠囊
- 使用兩個變量 - 溫度和濕度，來控制中草藥從微膠囊釋放到人體皮膚上的治療用途

#### 應用

- 本發明可以被使用在醫療服裝上作臨床治療
- 製造微膠囊的方法可應用於各種中草藥上

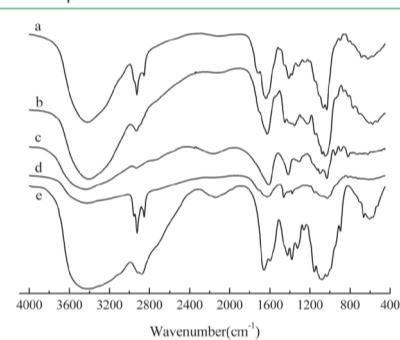
#### 獎項

第41屆瑞士日內瓦國際發明展 - 銅獎 (2013年4月)

傅里葉變換紅外光譜(FTIR)分析 — 製備封裝牡

丹皮的殼聚醣/海藻酸鈉微膠囊

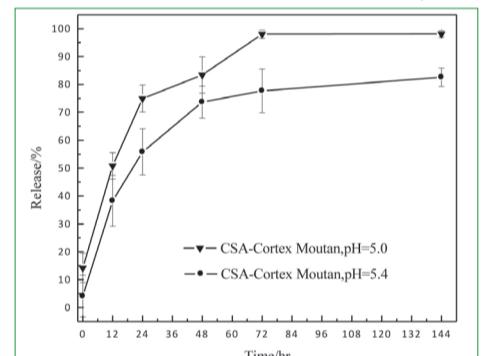
FTIR Analysis - Cortex Moutan was encapsulated in the chitosan/sodium alginate microcapsule



FTIR 光譜: (a) 空白微膠囊; (b) 牡丹皮; (c) 藻酸鈉; (d) 牡丹皮微膠囊 (a)+(b); and (e) 殼聚醣  
FTIR spectrum of (a) blank CSA microcapsule; (b) Cortex Moutan; (c) sodium alginate; (d) CSA microcapsule loaded with Cortex Moutan (a)+(b); and (e) chitosan

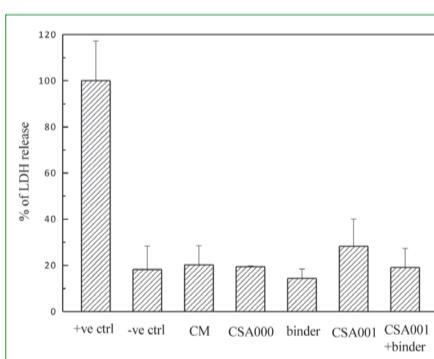
牡丹皮從微膠囊釋放測試

In vitro release of Cortex Moutan from Microcapsules



牡丹皮從微膠囊釋放之效果pH=5.0 and pH=5.4(n=3)

Release profiles of Cortex Moutan from CSA microcapsules immersed in PBS of pH= 5.0 and pH= 5.4 (n=3)



不同的樣品對細胞膜的影響±SD (n = 4)  
Effect of different samples on cell membrane damage in term of LDH release (CM, CSA000 and CSA001 represent Cortex Moutan, blank CSA and CM-loaded CSA respectively). Values represent mean ± SD (n = 4)

Patent Application No: 201210369537.6 (PRC)

#### Special Features and Advantages

- Produce a non-toxic microcapsule encapsulated with Traditional Chinese Herbal Medicine
- Use two variables – temperature and humidity to control the release of Traditional Chinese herbal medicine from microcapsule to human skin for clinical treatment

#### Applications

- The smart garment provides a new method of atopic dermatitis clinical treatment
- Method of producing microcapsule could be applied to encapsulate all kinds of TCHM

#### Award

Bronze Medal – 41st International Exhibition of Inventions of Geneva, Switzerland (April 2013)