



## 電子報第 168 期

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- ◆ 廖怡禎所長(愛之味股份有限公司食品安全管理所)
- ◆ 吳弦聰教授(明志科技大學化工系)

### 團體會員介紹

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### 產業新聞

- ◆ 嘉義「冷研碳索館」 國內首間氣體主題觀光工場

資料來源：[https://www.upmedia.mg/news\\_info.php?SerialNo=106244](https://www.upmedia.mg/news_info.php?SerialNo=106244)

### 技術文摘

- ◆ A comparative and economic study of the extraction of oil from Baru (*Dipteryx alata*) seeds by supercritical CO<sub>2</sub> with and without mechanical pressing 機械加壓與非機械加壓超臨界 CO<sub>2</sub> 提取巴魯 (*Dipteryx alata*) 種子油的比較經濟研究
- ◆ Exploitation of *Vitis vinifera*, *Foeniculum vulgare*, *Cannabis sativa* and *Punica granatum* By-Product Seeds as Dermo-Cosmetic Agents 作為皮膚美容劑的葡萄、香葉草、大麻和石榴籽副產品的開發
- ◆ Innovative Technologies for Extraction and Microencapsulation of Bioactives from Plant-Based Food Waste and their Applications in Functional Food Development 從植物性食物垃圾中提取和微囊化生物活性物質的創新技術及其在功能性食品開發中的應用
- ◆ Recovery of impregnated hydrocarbon in drill cuttings using supercritical carbon dioxide 使用超臨界二氧化碳回收鑽屑中的浸漬烴



## 專家介紹

### 【愛之味(股)公司食品安全管理所 廖怡禎所長】



❖專長：食品工程、超臨界二氧化碳技術

❖email：yjliaw@tqf.org.tw

廖怡禎所長於 1985 年至 1992 年，分別在美國康乃爾大學與美國賓州州立大學食品科學系攻讀碩士與博士學位，海外學成歸國後，進入財團法人食品工業發展研究所發揮長才，期間獲得一項專利、發表 16 篇期刊論文、研討會論文 22 篇、專書技術報告 19 篇。

廖所長，過去二十幾年在食品產業的經歷，涵蓋了食品研發、生產、製程、廠務、管理、行銷、業務，以及食品安全自主管理系統驗證與制度的制定與導入，和檢驗分析認證實驗室的建立；包括五王糧食股份有限公司副總經理、南僑化學工業股份有限公司總經理室特別助理兼常溫無菌化包裝米飯專案經理、義美食品股份有限公司食品安全研究室(中心)主任暨知識長、味全食品公司中央研究所協理級副所長兼品保中心主管、台灣良好作業規範發展協會(GMP 協會)秘書長、台灣優良食品發展協會(TQF 協會)秘書長/高級技術顧問/技術總監，目前任職於愛之味股份有限公司，擔任中央健康科學研究院食品安全管理所所長乙職。

廖所長擁有相當豐富的經驗，曾使用超臨界流體淨米技術製程專利，協助義美公司成立五王糧食公司，建立全球第一座利用超臨界流體技術生產清淨處理的食米品牌 - 「義美出好米」，並成立『食品安全研究室』，導入食品安全研究的概念與系統，建立原料管理與產品包裝成分與營養標示審查系統。

除此之外，廖所長也協助 GMP 協會走出食安事件造成的問題，且完成 TQF 驗證方案國際接軌 GFSI 認可平台申請，為台灣的食品安全建立良好制度，為國人把關。

廖所長亦是協會的創始會員之一，曾擔任協會理事與常務監事、監事乙職，現為第九屆監事，雖然廖所長平日事務繁忙，對於協會的活動熱心。



## 專家介紹

### 【明志科技大學化工系 吳弦聰教授】



- ❖ 專長：超臨界流體技術之微奈米化程序、分散聚合法製備單佈型微粒、酯化反應工程
- ❖ 研究方向：熱敏性物質微細化、呼吸道給藥之控制釋放藥物製劑
- ❖ email：stwu@mail.mcut.edu.tw

吳弦聰教授於 2006 年獲得國立臺灣科技大學化學工程系博士學位，現職任教於明志科技大學化學工程系。

吳教授長期投入超臨界流體技術之微奈米化程序開發，包括：超臨界輔助霧化 (supercritical assisted atomization, SAA)、超臨界抗溶劑 (supercritical anti-solvent, SAS)、氣體飽和溶液製備微粒 (particles from gas-saturated solution, PGSS)、超臨界流體輔助分散 (supercritical fluid-assisted dispersion, SFAD)、分散聚合法製備單佈型高分子微粒與顏料微膠囊等相關研究，成果亦取得中華民國發明專利：「次微米級微粒的製備方法」和「一種分散顏料微粒的方法」。自 2008 年開始執行科技部專題計畫，成果皆發表於國內外學術期刊及研討會，亦於 2012 及 2018 年度獲得科技部補助大專校院獎勵特殊優秀人才獎。因研究興趣與業界需求相近，所以與工研院材化所或國內企業亦有多項產學合作計畫。

除了教學與研究工作，吳教授亦是協會創始會員之一，曾擔任協會第五至第八屆監事，目前為第九屆理事；協助辦理年度技術應用與發展研討會和工作坊等活動，亦熱心協助與鼓勵學生參加研討會及論文競賽，致力於人才培育與產學雙贏。



## 高壓氣體特定設備操作人員安全衛生教育訓練班

需要有操作證照的單位，歡迎向協會報名。

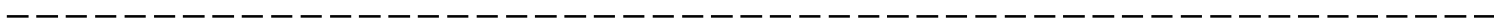
- 上課日期：**(日班)110/4/6~4/18 08:00~17:00**；**(夜班)110/4/6~4/18 18:30~21:30**
  - 上課時數：高壓氣體特定設備操作人員安全衛生教育訓練課程時數 35 小時+2 小時(測驗)。
  - 課程內容：高壓氣體概論 3HR、種類及構造 3HR、附屬裝置及附屬品 3HR、自動檢查與檢點維護 3HR、安全裝置及其使用 3HR、操作要領與異常處理 3HR、事故預防與處置 3HR、安全運轉實習 12HR、高壓氣體特定設備相關法規 2HR，共 35 小時。(另加學科測驗 1 小時及術科測驗約 1~2 小時)
  - 上課地點：高雄市楠梓區高楠公路 1001 號【金屬工業研究發展中心研發大樓 2 樓 產業人力發展組】
  - 參加對象：從事高壓氣體特定設備操作人員或主管人員。
  - 費用：本班研習費**新台幣 7,000 元整** (含教材、文具、午餐、實習)，**本會會員享九折優惠**。
  - 名額：每班 30 名，額滿為止。
  - 結訓資格：期滿經測驗成績合格者，取得【高壓氣體特定設備操作人員安全衛生訓練】之證書。
  - 報名辦法：1.傳真報名：(07)355-7586台灣超臨界流體協會  
2.報名信箱：tscfa@mail.mirdc.org.tw  
3.研習費請電匯至 兆豐國際商銀 港都分行(代碼017)  
戶名：社團法人台灣超臨界流體協會 帳號：002-09-018479 (註明參加班別及服務單位) 或以劃線支票抬頭寫「台灣超臨界流體協會」連同報名表掛號郵寄台灣超臨界流體協會，本會於收款後立即開收據寄回。
- ※洽詢電話：(07)355-5706 吳小姐 繳交一吋相片一張及身份證正本



# 報 名 表

課程名稱	高壓氣體特定設備操作人員安全衛生教育訓練				上課日期	110年4月6~18日	
姓名	出生年月日	身分證字號	手機號碼	畢業校名	公司產品		
服務單位					電 話		
服務地址	□□□				傳 真		
發票住址	□□□				統一編號		
負責人				訓練聯絡人 / 職稱	email :		
參加費用	共		元	參加性質	<input type="checkbox"/> 公司指派 <input type="checkbox"/> 自行參加		
繳費方式	<input type="checkbox"/> 郵政劃撥 <input type="checkbox"/> 支票 <input type="checkbox"/> 附送現金			報名日期			

※ 出生年月日、身分證字號、畢業校名、電話、地址須詳填，以利製作證書。





## 嘉義「冷研碳索館」 國內首間氣體主題觀光工場

呂中英 2021 年 02 月 05 日

由國內二氧化碳及乾冰專業製造廠、供應商冷研科技公司，投資設立的國內首間以乾冰、CO<sub>2</sub>(二氧化碳)為主題觀光工廠「冷研碳索館」，已於嘉義縣馬稠後產業園區正式營運，為迎接寒假及春節，即日起到 2 月底前，免費入場。

冷研科技有限公司是創立於 2000 年的二氧化碳乾冰專業製造廠及供應商，公司深耕環保節能領域，提供二氧化碳應用解決並成立研發部門，開發對環境友善清洗技術，包含 CO<sub>2</sub> [超臨界](#) 萃取、CO<sub>2</sub> snow 及乾冰清洗等設備，並提供等技術支援，將 CO<sub>2</sub> 推廣應用至全方位生活。

冷研三年前在朴子市與鹿草鄉交界，縣府新開發馬稠後產業園區一期購地 1768 坪，投資 2 億元新建廠房及觀光工廠，公司歷經三代經營，從日據時代就從事工業用二氧化碳，後因食安問題，冷研擴大汽水、啤酒等食品研發生產，觀光工廠以健康、教育、永續經營方向，提供多元、趣味生活與服務。

觀光工廠內附有許多寓教於樂的互動式體驗設備、二氧化碳科學探索小實驗室、乾冰舞台、泡泡樹，更有時下最必備的網美拍照空間，還有許多特色美食、獨家生產麥類飲品，真的是好玩又趣味、好吃又美味，不管是親子旅遊、三五好友、全家共遊都合適。

資料來源：[https://www.upmedia.mg/news\\_info.php?SerialNo=106244](https://www.upmedia.mg/news_info.php?SerialNo=106244)



# **A comparative and economic study of the extraction of oil from Baru (Dipteryx alata) seeds by supercritical CO<sub>2</sub> with and without mechanical pressing**

機械加壓與非機械加壓超臨界 CO<sub>2</sub> 提取巴魯 (Dipteryx alata) 種子油的比較經濟研究

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<sup>a</sup> LASEFI – Department of Food Engineering, School of Food Engineering, University of Campinas (UNICAMP), Brazil

<sup>b</sup> Faculty of Health Sciences, University Institution Colegio Mayor de Antioquia (COLMAYOR), Colombia

<sup>c</sup> Escuela Profesional de Ingeniería Agroindustrial, Universidad Nacional Amazonica de Madre de Dios (UNAMAD), Peru

## **Abstract :**

The present study evaluated the effect of **supercritical** fluid extraction (SFE) assisted by cold pressing (SFEAP) on the overall yield, extraction kinetics, composition of baru seed oil and manufacturing cost (COM). The best extraction conditions were determined in extraction assays combining different pressures (150–350 bar) and temperatures (35 and 45 °C). The extraction yield by SFEAP (28.6 g oil/100 g baru seed) was approximately 31% higher than that obtained by SFE (21.9 g oil/100 g baru seed), according to the kinetic study with the best extraction conditions (350 bar and 45 °C). The extraction yield observed under this condition allowed us to obtain a lower COM for both techniques (SFE was US\$ 118.32/kg baru oil and SFEAP was US\$ 87.03/kg baru oil) compared to lower pressures and temperatures. The oil obtained under all extraction conditions was rich in unsaturated fatty acids and other bioactive compounds. The extraction of baru seed oil by SFEAP resulted in a higher yield and lower manufacturing cost than SFE.



# Exploitation of *Vitis vinifera* , *Foeniculum vulgare* , *Cannabis sativa* and *Punica granatum* By-Product Seeds as Dermo-Cosmetic Agents

作為皮膚美容劑的葡萄、香葉草、大麻和石榴籽副產品的開發

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<sup>1</sup> Faculty of Pharmacy, Department of Pharmacognosy and Natural Products Chemistry, National and Kapodistrian University of Athens

<sup>2</sup> Faculty of Pharmacy, Department of Pharmacology, National and Kapodistrian University of Athens, 15771 Athens

## Abstract :

In the current study, by-product seed pastes (VSPs) from *Vitis vinifera*, *Foeniculum vulgare*, *Cannabis sativa* and *Punica granatum*, generated during the oil production process, were investigated for their potential exploitation as dermo-cosmetic agent. The extraction pipeline of all the raw materials was developed with emphasis on green methodologies and employed on laboratory scale based on industry-adopted techniques. Two different protocols were applied, **Supercritical** Fluid Extraction (SFE) and Ultrasound Assisted Extraction (UAE); the by-product pastes were defatted with **supercritical** CO<sub>2</sub> and n-Hexane, respectively. Then, two SFE extracts (CO<sub>2</sub> with 10% and 20% of ethanol as co-solvent) and two UAE extracts (with ethanol and ethanol/water 1:1 v/v) were obtained from each raw material. The providing yield range was between 2.6 to 76.3 mg/g raw material. The extracts were analyzed with High-Performance Liquid Chromatography coupled with Diode Array Detector (HPLC-DAD) and Liquid Chromatography coupled with High-Resolution Mass Spectrometer (LC-HRMS), and the major compounds, were identified. All the extracts were evaluated for their antioxidant and inhibition activity against collagenase, elastase and tyrosinase enzymes. Grapevine by-product extracts found rich in proanthocyanidins and presented the higher inhibition activity. A holistic green experimental methodology is proposed for the obtainment of extracts from significant medicinal plants by-products that provides us with promising results concerning dermo-cosmetic properties, especially for grape seeds extracts.

**Keywords** : grapevine; fennel; hemp; pomegranate; seed by-products; supercritical fluid extraction; ultrasound extraction; anti-tyrosinase; anti-collagenase; anti-elastase





# Innovative Technologies for Extraction and Microencapsulation of Bioactives from Plant-Based Food Waste and their Applications in Functional Food Development

從植物性食物垃圾中提取和微囊化生物活性物質的創新技術及其在功能性食品開發中的應用

Monalisha Pattnaik<sup>1</sup>, Pooja Pandey<sup>1,2,3</sup>, Gregory J. O. Martin<sup>3</sup>, Hari Niwas Mishra<sup>1</sup>  
and Muthupandian Ashokkumar<sup>2,\*</sup>

<sup>1</sup> Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur, India;

<sup>2</sup> School of Chemistry, The University of Melbourne, Parkville, VIC 3010, Australia <sup>3</sup> Department of Chemical Engineering, Australia

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## Abstract :

The by-products generated from the processing of fruits and vegetables (F&V) largely are underutilized and discarded as organic waste. These organic wastes that include seeds, pulp, skin, rinds, etc., are potential sources of bioactive compounds that have health imparting benefits. The recovery of bioactive compounds from agro-waste by recycling them to generate functional food products is of increasing interest. However, the sensitivity of these compounds to external factors restricts their utility and bioavailability. In this regard, the current review analyses various emerging technologies for the extraction of bioactives from organic wastes. The review mainly aims to discuss the basic principle of extraction for extraction techniques viz. **supercritical** fluid extraction, subcritical water extraction, ultrasonic-assisted extraction, microwave-assisted extraction, and pulsed electric field extraction. It provides insights into the strengths of microencapsulation techniques adopted for protecting sensitive compounds. Additionally, it outlines the possible functional food products that could be developed by utilizing components of agricultural by-products. The valorization of wastes can be an effective driver for accomplishing food security goals.

**Keywords** : agro-waste; bioactive compounds; therapeutic; encapsulation; functional food



# Recovery of impregnated hydrocarbon in drill cuttings using supercritical carbon dioxide

使用超臨界二氧化碳回收鑽屑中的浸漬烴

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Santos López-Lázaro<sup>a</sup>

<sup>a</sup> Analysis and Characterization Laboratory, Autonomous Juarez University of Tabasco, Tabasco,  
Villahermosa Centro, Mexico

<sup>b</sup> Biotechnology Laboratory, Autonomous Juarez University of Tabasco, Tabasco, Villahermosa  
Centro, Mexico

## Abstract :

Pollution due to waste generated by the oil industry has led to serious damage to ecosystems and the environment. Therefore, preventive and corrective actions must be taken to mitigate the ecological impact of waste resulting from oil-related activities, to explore and implement environment-friendly approaches, and achieve sustainable development.

In this study, an alternative treatment for cuttings generated during the drilling of oil wells was investigated by extracting the hydrocarbons present in such cuttings through the use of carbon dioxide under **supercritical** conditions. The extractions were performed in a **Supercritical** Fluid Technologies Inc. Model SFT-150 extractor, under varying pressure (2300–6600 psi) and temperature (52–109 °C), while maintaining constant carbon dioxide flow rate and extraction time, to analyse the effect of these two thermodynamic variables on the extraction efficiency. During **supercritical** extraction, 21.51 g of total hydrocarbons from drill cuttings (oil/kg) were recovered at 6000 psi and 100 °C. The results indicated that pressure had the strongest effect on the extraction yield, with only a small amount of hydrocarbons recovered at the lowest pressure for all fractions. At <3000 psi pressure, increasing the temperature led to a decrease in the amount of recovered hydrocarbons; at >3000 psi pressure, increasing the temperature led to an increase in the extraction yield.

**Keywords :** Pollution 、 Supercritical fluid extraction 、 Hydrocarbons 、 Drill cuttings