TSCFA台灣超臨界流體協會
Taiwan Supercritical Fluid Association

電子報第 198 期

活動訊息

- ***第22屆超臨界流體技術應用與發展研討會暨112年度會員大會***
  時間：2023年**10月27日(星期五)**
  地點：國立中興大學食品暨應用生物科技學系110演講廳
  https://www.tscfa.org.tw/ec99/rwd1480/news.asp?newsno=36
- ***14 TH ISSF(International Symposium on Supercritical Fluids)***
  日 期 ： **JUNE 2025**
  地 點 ： BALI
  CHAIR： JAEHOON KIM, SOUTH KOREA
  Scientific Meetings – ISASF (supercriticalfluidsociety.net)
- ***19 TH ISSF, (European Meeting on Supercritical Fluids EMSF)***
  日 期 ： **26-29 MAY 2024**
  地 點 ： MARIBOR, SLOVENIA
  CHAIR： ZELJKO KNEZ, SLOVENIA
  Scientific Meetings – ISASF (supercriticalfluidsociety.net)
- ***NEXT AEROGEL MEETING***
  日 期 ： **18 – 20 September 2024**
  地 點 ： Hamburg, Germany
  CHAIR： Irina Smirnova
  http://www.aerogel.org/community/news/
- ***ISSFT 2023***
  日 期 ： **10月16-20日**
  地 點 ： 水原市成均館大學(Sungkyunkwan University, Suwon)
  https://www.issft2023.com/

會員動態/產業新聞

- **亞果生醫×DKSH 插旗越南醫材**
  資料來源：https://newspaper.ctee.com.tw/share/AA/20230921/A44AC8/1259751
- **台灣超臨界流體協會 TSCFA 於 10 月 27 日舉辦研討會**
  資料來源：
  https://money.udn.com/money/story/11799/7454493?from=edn_search_result

淨零永續

- ***碳權交易實務推動人才研習班***--線上課程 X 實體工作坊

  走進碳權世界：以**碳知識、碳管理、碳實務**循序三步驟！24小時培訓帶你解鎖碳權交易實務

  課程亮點

  政策趨勢洞察 | 從國內外趨勢政策全面剖析碳權議題，點出關鍵眉角，建構你的碳權策略性思維

  專家深度解析 | 由擁有超過 20 年經驗的跨界碳權專家群親自授課，精準解讀碳權機制與工具

  模擬情境實戰 | 手把手帶你上機操作體驗，模擬演練碳市場交易申請流程，從帳戶註冊到碳權專案申請，由淺入深培養交易技巧

  https://college.itri.org.tw/Home/LessonData/1850C739-D1FA-40E7-9C97-A44FFAE28D7A

- **金屬中心 打造綠色鋁供應鏈**

  資料來源：

  https://tw.stock.yahoo.com/news/%E9%87%91%E5%B1%AC%E4%B8%AD%E5%BF%83-%E6%89%93%E9%80%A0%E7%B6%A0%E8%89%B2%E9%8B%81%E4%BE%9B%E6%87%89%E9%8F%88-201000067.html

- ***綠領減碳推動人才養成班 台北班(第2梯次)***--實體

  日期：**9/26~11/23，共計210小時**

  地點：工研院產業學院產業人才訓練一部(台北市大安區復興南路二段237號4樓)

  https://college.itri.org.tw/Home/LessonData/ABD62576-2C95-488A-9C7D-3A2E3D797616?from_rec=recapi-7fd64848bf-96n4f_original_1693577272_2070071

- ***推動碳中和人才認證班***--混成(實體+線上同步)

  日期：**10/17~12/26，共計58小時**

  地點：台北BR6科技大樓

  https://college.itri.org.tw/edm/D3/009/03/edm.html

  https://college.itri.org.tw/Home/LessonData/FC37461B-8C73-405A-B86C-B6614A82630A?from_rec=recapi-7fd64848bf-77hfp_original_1693576711_2266147

- ***推動碳中和人才認證班-碳交易x碳盤查x碳模式盤點與綠電導入***

  日期：**10/13(五)、10/17(二)、10/20(五)、11/28(二)、12/26(二)**

  地點：實體/線上

  https://college.itri.org.tw/edm/D3/009/03/edm.html

- ***112年第2次ESG委員會暨低碳轉型工作坊***
  日期：**10月25日(三)上午8時30分至16時30分**
  地點：台北市松山區八德路四段85號B1會議室(長德大樓) （當天攜帶筆電）
  報名連結：https://docs.google.com/forms/d/e/1FAIpQLSfFx0nBDcwuzTh-_LL3F5SWb59u2Owr9vNYNhDX9MWI4X93Tg/viewform?usp=sf_link
- ***化學產業淨零永續專業推動人才認證班(第03期)新竹***--混成(實體+線上同步)
  日期：**2023/11/30~2024/1/4，共計36小時**
  地點：數位自學雲端教室
  https://college.itri.org.tw/Home/LessonData/2B2E5236-3833-493D-85FD-C6D363C8DE48?from_rec=recapi-7fd64848bf-77hfp_original_1693576726_2266185

◆ IDB 產業節能減碳資訊網 INDUSTRIAL ENERGY SAVING AND CARBON REDUCTION INFORMATION WEB https://ghg.tgpf.org.tw/	◆ 淨零永續學校 https://college.itri.org.tw/nzschool/

團體會員介紹

- 亞果生醫股份有限公司

教育訓練班

- (日間班)高壓氣體特定設備操作人員安全衛生教育訓練班 10/11~10/19 ***已額滿!!!***

技術文摘

- Design and off-design performance analysis of supercritical carbon dioxide Brayton cycles for gas turbine waste heat recovery 燃氣輪機餘熱回收超臨界二氧化碳布雷頓循環的設計和非設計性能分析
- Development of an ultra-high-performance supercritical fluid chromatography method for the analysis of phenols in the pyrolysis aqueous fraction 開發用於分析熱解水餾分中酚類的超高性能超臨界流體色譜方法
- Fibres/Yarns/Fabrics Supercritical water route to recycling nylon 6 纖維/紗線/布料 超臨界水法回收尼龍 6
- Formulation and characterization of micro-emulsions of peppermint and coriander oils extracted by using a supercritical fluid system 使用超臨界流體系統提取的薄荷油和芫荽油的微乳液的配製和表徵
- Investigating Metal–Tributyl Phosphate Complexes during Supercritical Fluid Extraction of the NdFeB Magnet Using Density Functional Theory and X-ray Absorption Spectroscopy 使用密度泛函理論和 X 射線吸收光譜研究 NdFeB 磁體超臨界流體萃取過程中的金屬-磷酸三丁酯配合物

- Study on Thermal–Hydraulic Characteristics of Novel Channels for Printed Circuit Heat Exchanger Using Supercritical CO_2 超臨界 CO_2 印刷電路熱交換器新型通道熱流特性研究
- Targeted Chemical Processing Initiating Biosome Action-Potential-Matched Artificial Synapses for the Brain–Machine Interface 靶向化學處理啟動生物組動作電位匹配的腦機接口人工突觸
- Technoeconomic analysis of supercritical fluid extraction process for recycling rare earth elements from neodymium iron boron magnets and fluorescent lamp phosphors 超臨界流體萃取從釹鐵硼磁體和螢光燈螢光粉中回收稀土元素之技術經濟分析

台灣超臨界流體協會
電話：(07)355-5706　E-mail：tscfa@mail.mirdc.org.tw


TSCFA
2023年
第二十二屆 超臨界流體技術應用與發展研討會
暨 112年度會員大會
指導單位| MOST 科技部 經濟部技術處
主辦單位| TSCFA 台灣超臨界流體協會
國立中興大學食品暨應用生物科技學系
2023.10.27
INVITATION


時 間： 112年10月27日(五)
地 點： 國立中興大學
食品暨應用生物科技學系
食品生物科技大樓 演講廳110
（台中市南區興大路145號）
往台北
中港路交流道
五權西路交流道
中港路
英才路
五權路
台中火車站
台中路
五權西路
建成路
忠明南路
五權南路
興大路
國光路
中興大學
中山高速公路
往中投公路
中二路
惠蓀堂
大學北路
中興路
中興東路
大學路

亞果生醫×DKSH 插旗越南醫材

2023.09.21．文 / 周榮發

在國際再生醫學領域具有深厚專業技術的亞果生醫（6748），20 日與全球知名醫材通路商 DKSH（瑞士商）於越南達成國際合作協議，核准 DKSH 為其在越南傷口照護、牙科、骨科及大外科領域的獨家經銷商。

根據這份具有戰略性意義的協議，亞果生醫的膠原蛋白敷料和膠原蛋白骨填料，將成為 DKSH 在越南市場的獨家經銷產品；這兩款高級醫療材料通常用於外科手術和牙科植牙手術，其天然、無毒的特性使其在人體中具有卓越的生物相容性，這將為越南的再生醫療提供更專業的選擇和解決方案。該協議初期簽署為期五年，雙方將根據合作的績效和市場表現進一步討論未來的合作模式。此一合作除加速亞果生醫的產品在越南市場的推廣，更可望為越南的醫療行業帶來更高端的創新。

該公司執行長謝達仁博士表示，在過去的兩年多時間裡，亞果生醫在越南市場不斷發展壯大，與當地優秀的醫師合作，試用了亞果的敷料及骨填料，並給予了寶貴的回饋，並向更多越南醫師推廣亞果生醫的產品；此次與 DKSH 合作，將能更深入的打進越南醫材市場，也能促進台灣與越南醫師們互相交流學習。DKSH 認為亞果生醫的產品在越南市場具有巨大的潛力，該合作將充分發揮雙方的優勢，成功開拓市場。

謝達仁指出，亞果生醫致力於再生醫學研發，憑藉其專利超臨界二氧化碳去細胞技術，以天然無毒的方式，不含化學藥劑與交聯劑，完整的去除組織中的細胞與雜質，

留下天然的膠原蛋白細胞支架（非重組膠原蛋白），以此備製的高階醫療材料，具有良好生物相容性，現階段是人體最佳的修復材料，其中敷料可作為外科傷口修復、牙科植牙手術軟組織生長等用途，骨填料用於修護骨缺損或牙科植牙手術硬組織缺損填補。

眾所皆知，瑞士商 DKSH 集團是一家領先的醫材市場擴展服務提供商，致力於幫助企業在亞洲市場實現增長；此次，除與當地耕耘百年的醫療通路商「瑞士 DKSH 集團」，簽訂五年包括牙科、骨科、傷口照護越南總代理合約外，也與越南衛生部簽署 MOU，針對眼角膜移植在越南的人體試驗及取證上市進行合作，相信與 DKSH 的國際策略合作，除對企業整體營收有實質幫助外，其企業的國際品牌價值也將同步攀升。亞果生醫第三季正積極規劃上市櫃事宜。

資料來源：https://newspaper.ctee.com.tw/share/AA/20230921/A44AC8/1259751

台灣超臨界流體協會 TSCFA 於 10 月 27 日舉辦研討會

2023/09/21 經濟日報 黃逢森

台灣超臨界流體協會 TSCFA 2023 年「第 22 屆超臨界流體技術應用與發展研討會」，將於 10 月 27 日在中興大學舉辦，同時舉行 112 年度會員大會，歡迎各界對超臨界流體技術有興趣的產業及學者報名參加。

該協會積極推動「超臨界流體技術」產業應用與發展，藉著每年舉辦研討會，分享研發成果及產業創新應用，期以開拓新市場、創造應用領域商機；今年將於 10 月 27 日在國立中興大學食品暨應用生物科技學系食品生物科技大樓演講廳 110(台中市南區興大路 145 號)，舉辦 TSCFA 2023 年「第 22 屆超臨界流體技術應用與發展研討會」及 112 年度會員大會，邀請專家學者作專題演講與論文發表，涵蓋「食品與生技醫療」、「能源與綠色製程」、「材料與精密製造」等三大類，期引入新技術應用的觀念及觸發潛在商機。並將研發成果與國內產業界分享，歡迎報名參加，聽演講、學技術、展市場、交朋友、開眼界。

超臨界流體為業界公認的綠色化學技術之一，採用 CO_2 為萃取劑，具有無毒、無色、無味、無臭、不燃、易回收、操作溫度低等優點，可在低溫下萃取熱不穩定物質，因而成為當今食品、藥品工業最重要的萃取分離和純化技術之一。

台灣超臨界流體協會電話（07）355-5706。

資料來源：https://money.udn.com/money/story/11799/7454493?from=edn_search_result

綠茵生技 GREENYN BIOTECHNOLOGY

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研發人員

Job Description

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- 最適製程開發與試產導入。
- 功效試驗設計&執行、機制分析&驗證。
- 檢驗分析方法開發&確效。
- 市場趨勢分析&資料建立。

Job Conditions

- 具動植物萃取、分析方法與產線製程開發經驗者佳，食品、生科相關領域者為優。
- 個性樂觀積極、開朗活潑。

報名請掃描　104人力銀行　公司網頁

Human Resources Department
04-22382867#171 Cherry
cherrychiang@greenyn.com.tw

亞果生醫：創新科技引領環境永續發展

2023 傑出生技產業獎
年度產業創新獎

「超臨界二氧化碳平台技術於再生醫療產業之應用」，組織器官短缺已經成為全球極為嚴重的醫療問題，由亞果生醫自主開發之『超臨界二氧化碳流體組織器官去細胞技術』，製備各種動物來源組織器官生醫材料產品提供人體作為組織器官再生修護醫療器材，期望解決病患長久等待人體器官組織捐贈之處境，提供一般大眾可負擔之組織修護及器官再生材料。

亞果生醫董事長 謝達仁博士

關於亞果

亞果生醫創立於 2014 年 6 月，以研發生產人體組織工程修護材料為主。運用獨特專屬的平台技術超臨界二氧化碳（$ScCO_2$）去細胞技術，將動物器官組織中的脂肪、細胞以及非膠原蛋白結構的雜質清除乾淨，保留完整的膠原蛋白支架結構，做為人體器官組織修護材料。

亞果生醫的終極目標是以動物來源的組織器官生醫材料，進行人體各部位組織器官的修護再生。透過國際合作，塑造亞果生醫成為全球組織工程再生醫學領域的領航者。

亞果生醫期望能以最天然環保的科技，發展出一系列對人體器官組織修護所需的醫療材料，運用於人體缺損的修護填補

董事長理念

過去三十幾年台灣在生技醫療產業發展的道路上跌跌撞撞，一路摸著石子過河。靠著前人篳路藍縷、前仆後繼才有今日生技醫療產業的榮景，這一切得來不易所以彌足珍貴，期望不管是業內或業外對生技醫療產業有熱情、有憧憬的人士，都可以一起來參與這個產業的成長茁壯。

亞果生醫期望能以最天然環保的科技，發展出一系列對人體器官組織修護所需的醫療材料，運用於人體缺損的修護填補；牙齒手術之傷口修護、齒槽骨填補；燒燙傷專科之人工真皮或糖尿病潰瘍傷口的照護敷料；冠狀動脈繞道手術所需之血管材料；脊柱神經修護所需之脊索神經管；眼角膜受損修護所需之人工眼角膜等等生醫材料，都是亞果生醫所研發之產品。

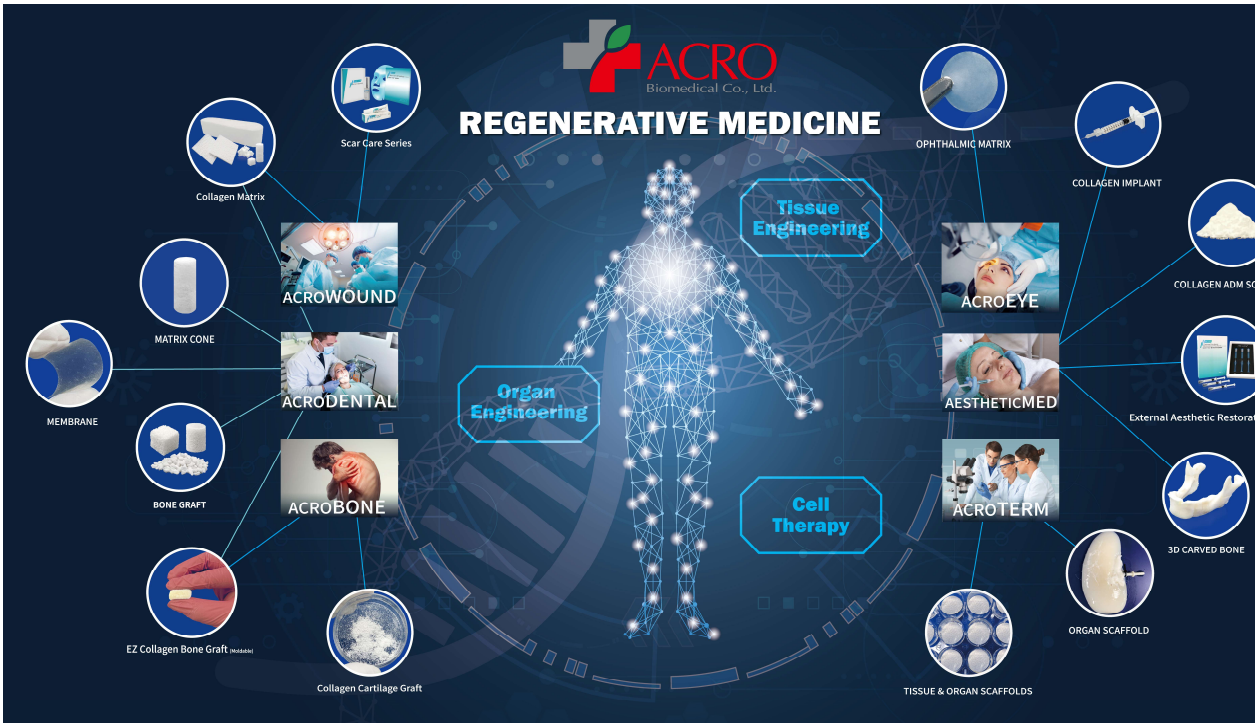
亞果生醫是一個需要長期投入研究開發的公司，未來將結合各種藥物、胜肽、蛋白質生長因子、甚至人體幹細胞來加強各項產品之器官組織修護能力，發展新一代的再生醫療組織工程，造福人群。

$ScCO_2$製程方法進行生物組織清洗與去細胞，特點是可在單一步驟完成去細胞、清潔、分離、滅菌等多種效果

超臨界二氧化碳

亞果生醫率先以此技術應用在動物組織材料之去細胞，在接近常溫的條件下，配合溫度、壓力改變 CO_2 的理化特性，以無毒、無殘留的 CO_2 代替有機溶劑或有毒藥劑作為溶劑，對醫材原料加以進行清潔、去細胞與滅菌的動作。

以此 $ScCO_2$ 製程方法進行生物組織清洗與去細胞，特點是可在單一步驟完成去細胞、清潔、分離、滅菌等多種效果，可保持組織的生物活性，減少生產製作程序破壞材料的原有優良特性，還能幫助將其它製程所殘留的藥劑加以去除乾淨。



亞果生醫利用超臨界二氧化碳，進行生物組織之去細胞，以獲得完整無損的脫細胞天然膠原蛋白支架。此天然膠原蛋白支架具有無化學殘留、脫細胞徹底及天然孔隙結構及機械強度保留度高的特點，是一個應用層面廣泛的創新的技術平台。

去細胞之天然器官膠原蛋白支架可以靠著幹細胞的貼附聚集、生長、分化成各種功能細胞，最終重建成一個具有功能的器官。亞果的團隊正在嘗試心臟、肝臟及腎臟的器官重建工程，希望在不久的將來人們可以不用排隊等待捐贈的器官。

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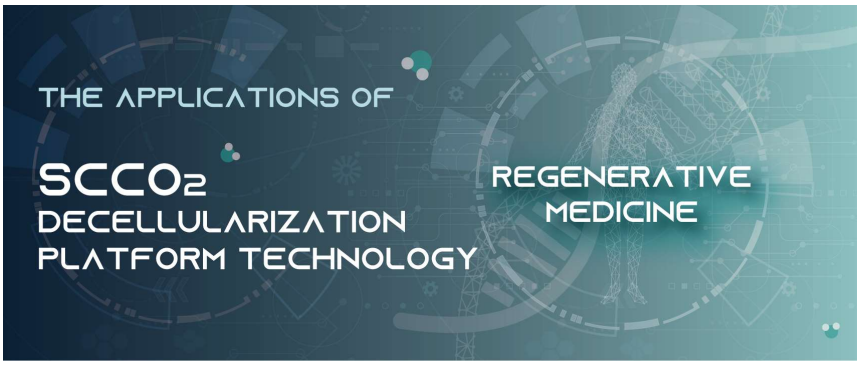

亞果生醫的專業認證

醫療器材許可證　　**品質系統認證**

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TSCFA台灣超臨界流體協會
Taiwan Supercritical Fluid Association

(日間班)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：**10/11~10/13 08:00~17:00；10/18~10/19 08:00~17:00(實習)**

●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**，**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	112 年 10/11~10/19	
姓　　名	出生年月日	身份證字號	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	人	訓練聯絡人 / 職稱		email：		
參加費用	共　　元	參加性質		□公司指派　　□自行參加		
繳費方式	□郵政劃撥　□支票　□附送現金			報名日期	年　　月　　日	

※ 出生年月日、身份證字號、畢業校名、電話、地址須詳填，以利製作證書。〔！〕

上課日期時間表

課程名稱：(日間班)高壓氣體特定設備操作人員安全衛生教育訓練班

2023/10/11 (三)	08:00 ~ 17:00
2023/10/12 (四)	08:00 ~ 17:00
2023/10/13 (五)	08:00 ~ 17:00
2023/10/18 (三)	08:00 ~ 17:00 (實習第 1 組)
2023/10/19 (四)	08:00 ~ 14:00 (實習第 1 組)

Design and off-design performance analysis of supercritical carbon dioxide Brayton cycles for gas turbine waste heat recovery

燃氣輪機餘熱回收超臨界二氧化碳布雷頓循環的設計和非設計性能分析

By **Jiancong Chen [a], Lijun Liu [b], Gaoliang Liao [a], Feng Zhang [a], Jiaqiang E [a], Si Tan [a]**

[a] College of Mechanical and Vehicle Engineering, Hunan University, Changsha 410082, China

[b] College of Civil Engineering, Hunan University, Changsha 410082, China

Abstract

The utilization of waste heat from marine gas turbines is an effective means of meeting future electric demands and achieving energy conservation and emission reduction. Meanwhile, the supercritical CO_2 Brayton cycle, benefiting from its compact structure, is well-suited for power generation in limited spaces. Based on the reality that gas temperature and flow rate deviate from the design point with the variation of gas turbine operating conditions, this paper proposes a method for analyzing the off-design performance of supercritical CO_2 cycles based on thermal source fluctuations rather than simply providing prescribed temperatures on the cycle side. This method allows for a clear understanding of the impact on the cycle when there are fluctuations in the thermal source. Firstly, the thermodynamic performance and economic viability of four types of supercritical CO_2 cycles, namely simple regenerative, recompression, intercooling, and reheat, were optimized using a multi-objective genetic optimization algorithm. Subsequently, the off-design performance of these four cycles was investigated when the gas temperature and flow rate deviate from the design point. The results indicate that, compared to the decrease in gas temperature, the reduction in gas flow rate has a greater impact on the decline in cycle performance. Decreasing gas temperature enhances the exergy efficiency of all four cycles, while reducing gas flow rate initially increases and then decreases the exergy efficiency. The decrease in turbomachinery efficiency significantly contributes to the decline in cycle performance. When the gas flow rate exceeds 55% of the design value, it is recommended to adopt an intercooling cycle arrangement. Otherwise, a recompression cycle layout should be used.

資料來源：https://doi.org/10.1016/j.applthermaleng.2023.121295

Development of an ultra-high-performance supercritical fluid chromatography method for the analysis of phenols in the pyrolysis aqueous fraction

開發用於分析熱解水餾分中酚類的超高性能超臨界流體色譜方法

By **Antonia Regina dos S. Gois, Carlos Fernando de S. Santos, Igor M. Santana, Márcia Cristina Breitkreitz & Lisiane dos S. Freitas**

hemistry Department, Federal University of Sergipe, Campus Prof. José Aloísio de Campos, Av. Marechal Rondon, S/N, Jardim Rosa Elze, São Cristóvão, SE, Brazil

Abstract

The pyrolysis process consists of the thermal decomposition of biomass in an inert atmosphere, which produces a liquid (bio-oil) composed of a complex mixture of organic compounds, including an oil and water phase. The aqueous fraction can reach up to 45% w/w, and understanding its composition is of utmost importance in determining its intended destination, whether for the reuse of compounds in industrial applications or for treating the effluent for disposal. In this study, a fast, direct, and efficient method using ultra-high-performance supercritical fluid chromatography (UHPSFC) was developed and optimized for monitoring phenols in aqueous samples obtained from the pyrolysis processing of six different biomass sources. The following parameters were evaluated for method optimization: stationary phase type, mobile phase flow, organic modifier, sample diluent, temperature, pressure, and modifier gradient time. With a total analysis time of 26 min, out of the fourteen (14) investigated phenolic compounds, eleven (11) were successfully separated after method optimization, and among them, five (5) were quantified in all six aqueous fractions. The aqueous fractions of residue from cowpea pod (1.89 $mg.mL^{-1}$), sugar apple (3.09 $mg.mL^{-1}$), and acerola (4.79 $mg.mL^{-1}$) presented lower concentrations compared to grape (8.16 $mg.mL^{-1}$), pine nuts (6.68 $mg.mL^{-1}$), and guava (6.05 $mg.mL^{-1}$) fractions. However, even at lower concentrations, all biomasses showed promising results regarding the phenolic compound content, analytes that have high added value for the chemical industry.

Keywords: Biomass, Pyrolysis, Aqueous fraction, UHPSFC-DAD, Phenols

資料來源：https://link.springer.com/article/10.1007/s00216-023-04906-1

Fibres/Yarns/Fabrics

Supercritical water route to recycling nylon 6

纖維/紗線/布料超臨界水法回收尼龍 6

Toray Industries has signed an agreement with Honda Motor to jointly develop a chemical recycling technology for glass-fibre reinforced nylon 6 parts recovered from end-of-life vehicles.

The two companies have begun verifying this technology which entails depolymerizing with subcritical water and regenerating the materials as caprolactam, the raw monomer for nylon 6.

Subcritical water is employed in a high-temperature, high-pressure state to dissolve and hydrolyze organic compounds.

The two companies focused on such subcritical water characteristics as its high permeability, dissolving power and hydrolysis effect on resins in developing the technology to successfully depolymerize nylon 6. Subcritical water is free of catalysts, additives do not affect it and it can depolymerize nylon 6 in a short time to create high yields of raw monomer. Separating, refining and repolymerizing the monomer makes it possible to regenerate nylon 6 that performs like a virgin material.

Japan's Ministry of the Environment has adopted this technology for a three-year project to establish a decarbonized circular economy system, including validating recycling systems for plastics and other resources. As part of the project, Toray and Honda will set up a pilot facility with a processing capacity of 500 metric tons of raw resin annually, to conduct validation testing with it.

The first step with this work is to recycle used automotive plastic parts into the same automotive materials. The two companies will develop depolymerization and monomer separation and refining technologies by employing intake manifolds as raw materials for engine intake system parts. They aim to apply these technologies for recycling chemicals in automotive resin parts by around 2027.

Down the track, the plan is to broaden the scope of the chemical recycling technology to make apparel, films, and other non-automotive applications.

資料來源：https://www.innovationintextiles.com/supercritical-water-route-to-recycling-nylon-6/

Formulation and characterization of micro-emulsions of peppermint and coriander oils extracted by using a supercritical fluid system

使用超臨界流體系統提取的薄荷油和芫荽油的微乳液的配製和表徵

By **Ana Javaid, Ali Imran, Muhammad Umair Arshad, Muhammad Afzaal & Mohd Asif Shah**

a Department of food science, Government College University, Faisalabad, Pakistan

b Department of Economics, Kabridahar University, Somali, Ethiopia

c Division of Research and Development, Lovely Professional University, Phagwara, Punjab, India

Abstract

The present study was designed to formulate and characterize the micro-emulsions of peppermint and coriander oil that extracted by using supercritical fluid extraction system. Moreover, Guar gum and maltodextrin were used as coating materials while preparing encapsulates of peppermint and coriander through freeze-drying. The moisture contents of mint leaves and coriander were 81.28 ± 7.12 and 84.62 ± 6.46% respectively whereas the recorded protein content in mint and coriander leaves were 1.456 ± 0.13 and 5.06 ± 0.03% respectively. The crude fat was high in mint leaves as compared to coriander. However, the ash content was 2.98 ± 0.278 in mint and 2.8 ± 0.12 in coriander leaves. The total phenolic contents (TPC) and antioxidant activity coriander essential oil was high as compared to peppermint oil. The results showed the better antioxidant activity of coriander than peppermint. Encapsulation efficiency of powder showed significant results of wall material. T3 (maltodextrin and coriander oil) exhibited better binding capability of bioactive components as compared to guar gum and mint. T3 was coriander and maltodextrin better ability to inhibit the oxidation process and had good DPPH assays as compared to other treatments. This study showed that the T3 (maltodextrin and coriander oil) exhibited better binding capability of bioactive components as compared to guar gum and mint. T3 was (coriander and maltodextrin) better ability to inhibit the oxidation process and had good DPPH assays to other treatments.

Keywords: Peppermint, coriander, freeze drying, encapsulated powder, Guar gum, maltodextrin

資料來源：https://doi.org/10.1080/10942912.2023.2246684

Investigating Metal–Tributyl Phosphate Complexes during Supercritical Fluid Extraction of the NdFeB Magnet Using Density Functional Theory and X-ray Absorption Spectroscopy

使用密度泛函理論和 X 射線吸收光譜研究 NdFeB 磁體超臨界流體萃取過程中的金屬-磷酸三丁酯配合物

By **Jiakai Zhang, Ning Chen, Valeria Morozova, Oleksandr Voznyy, and Gisele Azimi**

Laboratory for Strategic Materials, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Ontario M5S 3E5, Canada

Abstract

Supercritical fluid extraction (SCFE) is gaining significant interest as a green technology for the recycling of end-of-life waste electrical and electronic equipment (WEEE). Neodymium iron boron (NdFeB) magnets, which contain large quantities of critical rare-earth elements such as neodymium, praseodymium, and dysprosium, are widely used in wind turbines and electric/hybrid vehicles. Hence, they are considered a promising secondary resource for these elements when they reach their end-of-life. Previously, the SCFE process was developed for recycling WEEE, including NdFeB; however, the process mechanism remains unexplored. Here, density functional theory, followed by extended X-ray absorption fine structure and X-ray absorption near-edge structure analyses, are utilized to determine the structural coordination and interatomic interactions of complexes formed during the SCFE of the NdFeB magnet. The results indicate that Fe(II), Fe(III), and Nd(III) form Fe(NO3)2(TBP)2, Fe(NO3)3(TBP)2, and Nd(NO3)3(TBP)3 complexes, respectively. This theory-guided investigation elucidates the complexation chemistry and mechanism during the SCFE process by rigorously determining the structural models.

資料來源：https://doi.org/10.1021/acs.inorgchem.2c04508

Study on Thermal–Hydraulic Characteristics of Novel Channels for Printed Circuit Heat Exchanger Using Supercritical CO_2

超臨界 CO_2 印刷電路熱交換器新型通道熱流特性研究

By **He Yang, Jinduo Li, Huimin Wei, Xiaoze Du, Hongwei Wu**

Key Laboratory of Power Station Energy Transfer Conversion and System,
North China Electric Power University, Ministry of Education, Beijing 102206, China

Abstract

Two new types of printed circuit heat exchanger (PCHE) channels are proposed based on the typical airfoil fin PCHE channel proposed in literatures (standard channel) to further improve the thermal–hydraulic performances of airfoil fin PCHE channel. The small shuttle fins and oval fins are employed between the adjacent two airfoil fins of two novel channels, respectively. Using supercritical CO_2 as the working fluid, the thermal–hydraulic performances and enhancement mechanisms of the novel channels are numerically investigated. The results show that the channel with shuttle fins has the best comprehensive performance. The Nusselt number of the channel with shuttle fins is 6.7–26% larger, and the f-factor is 8.3–18.6% larger than that of the standard channel under the selected conditions, which leads to a 3–19.1% increase in the PEC (comprehensive performance evaluation criteria). The Nusselt number of the channel with oval fins is 9–27.3% larger, and the f-factor is 26.6–43.4% larger than that of the standard channel, which leads to a 1–15.3% increase in the PEC. The applications of small fins between the adjacent two fins can effectively reduce the low-velocity region area and enhance the local disturbance, thereby effectively improving the thermal–hydraulic performance. The enhancement mechanism of the novel fin PCHE channel structure can be well explained by the principle of field synergy. It can be found that the synergies of the temperature gradient field and the velocity field in two novel channels are significantly improved.

Keywords: printed circuit heat exchanger, shuttle and oval fins, thermal–hydraulic performance enhancement, supercritical CO_2, field synergy principle

資料來源：https://doi.org/10.1115/1.4062998

Targeted Chemical Processing Initiating Biosome Action-Potential-Matched Artificial Synapses for the Brain–Machine Interface

靶向化學處理啟動生物組動作電位匹配的腦機接口人工突觸

By **Lei Li, Shidong Wang, Xinqing Duan, Zewen Wang, and Kuan-Chang Chang**

School of Electronic and Computer Engineering, Peking University Shenzhen Graduate School, Shenzhen, Guangdong 518055, People's Republic of China

Abstract

A great gap still exists between artificial synapses and their biological counterparts in operation voltage or stimulation duration. Here, an artificial synaptic device based on a thin-film transistor with an operating voltage (−50–50 mV) analogous to biological action potential is developed by targeted chemical processing with the help of supercritical fluids. Chemical molecules [hexamethyldisilazane (HMDS)] are elaborately chosen and brought into the target interface to form charge receptors through supercritical processing. These charge receptors with the ability of capturing electrons mimic neurotransmitter receptors in terms of mechanism and constitute key players accounting for the synaptic behaviors. The relatively lower electrical barrier height contributes to an action-potential-matched operating voltage and considerably low power consumption (∼1 pJ/synaptic event), minimizing the divide with biological synapse for a seamless linkage to the biosystem or brain–machine interface. The stable synaptic behaviors also lead to near-ideal accuracy in pattern recognition. Moreover, this methodology that introduces chemical groups into a target interface can be viewed as a platform technology that could be adapted to other conventional devices with suitable chemical molecules to reach designed synaptic behaviors. This environmentally friendly and low-temperature processing method, which can be performed even after device fabrication, has the potential to play an important role in the future development of bionic devices.

Keywords: artificial synapse, supercritical fluids, chemical processing, action potential, thin-film transistors

資料來源：https://doi.org/10.1021/acsami.3c07684

Technoeconomic analysis of supercritical fluid extraction process for recycling rare earth elements from neodymium iron boron magnets and fluorescent lamp phosphors

超臨界流體萃取從釹鐵硼磁體和螢光燈螢光粉中回收稀土元素之技術經濟分析

By **Gisele Azimi [a], Maziar E. Sauber [b], Jiakai Zhang [a]**

[a] Laboratory for Strategic Materials, University of Toronto, Department of Chemical Engineering and Applied Chemistry, 200 College Street, Toronto, Ontario, M5S 3E5, Canada

[b] CanmetMINING, Natural Resources Canada, 555 Booth Street, Ottawa, Ontario, K1A 0G1, Canada

Abstract

This study offers a comprehensive and rigorous analysis of the technoeconomics of supercritical fluid extraction (SCFE) technology as applied to the recovery of rare earth elements (REEs) from end-of-life neodymium iron boron magnets and fluorescent lamp phosphors. Drawing on an array of data sources including laboratory results, literature data, scaling models, scenario analysis, and sensitivity analysis, this study conducts a sound economic analysis of the SCFE process at an industrial scale. The study renders a detailed estimation of the costs and revenues associated with the process and identifies the primary factors that impact its profitability. The findings demonstrate that the SCFE of REEs from these feedstocks can be economically viable under certain circumstances, with the efficiency of extracting terbium, dysprosium, and neodymium and the price of their respective oxides emerging as key drivers of profitability. By providing valuable insights into the feasibility of the SCFE process for REEs recovery, this study informs future research and development activities in the field.

資料來源：https://doi.org/10.1016/j.jclepro.2023.138526