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

電子報第 199 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
  第 17 屆台灣超臨界流體技術研究優良論文獎得獎名單
  論文摘要集暨會員大會手冊連結網址及QR Code：
  https://www.tscfa.org.tw/ec99/rwd1480/news.asp?newsno=39

- ***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/

會員動態/產業新聞

- 亞果生醫膠原蛋白眼角膜基質產品，榮獲國家藥物科技研究發展獎！
- TSCFA 台灣超臨界流體學會 興大登場
  資料來源：https://www.cna.com.tw/postwrite/chi/355305

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

- ***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

◆ 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

- 東聯化學股份有限公司

教育訓練班

- (夜間班)高壓氣體特定設備操作人員安全衛生教育訓練班 11/20~12/03
- (日間班)高壓氣體特定設備操作人員安全衛生教育訓練班 11/20~11/24

技術文摘

- Assessment of Part-Load Operation Strategies of Supercritical Power Cycles Using Carbon Dioxide Mixtures in CSP Plants, Including Air-Cooled Condenser Optimisation 評估 CSP 發電廠中使用二氧化碳混合物的超臨界動力循環的部分負載運行策略，包括風冷冷凝器優化
- Eugenol isolated from supercritical fluid extract of *Ocimum sanctum*: a potent inhibitor of DENV-2 從聖羅勒超臨界流體萃取物中分離出的丁香酚：DENV-2 的有效抑制劑
- Physics-Informed Deep Learning-Based Proof-of-Concept Study of a Novel Elastohydrodynamic Seal for Supercritical CO_2 Turbomachinery 於物理知識的深度學習超臨界 CO_2 渦輪機械 新型彈性流體動力密封的概念驗證研究
- Solubility measurement of verapamil for the preparation of developed nanomedicines using supercritical fluid 使用超臨界流體製備開發的奈米藥物時維拉帕米的溶解度測量
- Structures and transport properties of supercritical SiO2-H2O and NaAlSi3O8-H2O fluids 超臨界 SiO2-H2O 和 NaAlSi3O8-H2O 流體的結構和輸運特性
- Supercritical Carbon Dioxide Utilization for Hydraulic Fracturing of Shale Reservoir, and Geo-Storage: A Review 利用超臨界二氧化碳於頁岩油藏水力壓裂與地質封存之文獻回顧
- The Approach of Pressure Enthalpy Phase Diagram in Supercritical CO_2 Pipeline Design 以壓力焓相圖作超臨界 CO_2 管路設計之方法

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

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

第 17 屆台灣超臨界流體技術研究優良論文獎
得獎名單

◆ 「論文優良獎」得獎名單：

王俊閔(國立高雄大學電機工程學系)

展演以超臨界 CO_2 技術合成製備 Ti_3C_2 二維過渡金屬碳化物(MXenes)之程序及其材料特性之研究

◆ 「論文佳作獎」得獎名單：

賴冠辰(國立臺北科技大學化學工程與生物科技系)

以超臨界反溶劑技術製備丙磺舒高分子非晶型固體分散微粒之研究

◆ 「優良海報論文獎」得獎名單：

Salal Hasan Khudaida (國立臺北科技大學化學工程與生物科技系)

利用溶液模式進行蒽醌類衍生物固體於超臨界二氧化碳中之溶解度行為關連與預測

◆ 「佳作海報論文獎」得獎名單：

Shohei Yoshida (Institute of Innovative Research, Tokyo Institute of Technology)

Supercritical CO_2-Assisted Metallization of UHMW-PE Fibers toward Weavable Devices

Yin-Chih Fu (Kaohsiung Municipal Ta-Tung Hospital, Kaohsiung Medical University)

Regeneration of Supercritical Carbon Dioxide Decellularized Kidney by Direct *In Vivo* Implantation in the Rabbit Model

江瑞恆(國立中央大學化學工程與材料工程學系)

1,5-二氨基蒽醌與左氧氟沙星於超臨界二氧化碳中之溶解度量測

恭賀所有獲獎名單及其團隊!!!

◆ ***ISSFT 2023***

日期：**10月16-20日**

地點：水原市成均館大學(Sungkyunkwan University, Suwon)

本會理事長及副理事長前往參加此次活動

台灣代表團在水原市聚餐

亞果生醫膠原蛋白眼角膜基質產品
榮獲國家藥物科技研究發展獎！

正本

檔　　號：
保存年限：

衛生福利部食品藥物管理署　函

地址：115021 臺北市南港區研究院路一段130巷109號
聯絡人：羅琪
聯絡電話：02-27877223
傳真：02-26532055
電子郵件：star780510@fda.gov.tw

821
高雄市路竹區路科二路57號2樓

受文者：亞果生醫股份有限公司

發文日期：中華民國112年10月6日
發文字號：FDA企字第1121202605號
速別：普通件
密等及解密條件或保密期限：
附件：報名表1份

主旨：敬邀貴公司出席本署與經濟部產業發展署舉辦之112年度「國家藥物科技研究發展獎」頒獎典禮，請查照。

說明：

一、貴公司申請案件「亞比斯·可拉® 膠原蛋白眼角膜基質」獲得製造技術類複審入圍之殊榮，謹訂於112年11月21日(星期二)下午2時於國家生技研究園區C棟2樓國際會議廳（臺北市南港區研究院路一段130巷99號C棟）舉行頒獎典禮，獲獎之獎項將於典禮中公布，敬邀出席領獎共享殊榮。

二、檢附報名表如附件，請薦派5名人員出席頒獎典禮，並於112年10月31日前以電子郵件回復參加者名單予本署國家藥物科技研究發展獎工作小組(e-mail：joe123@topwin.com.tw，連絡電話：02-89131111轉211徐先生)。

正本：亞果生醫股份有限公司
副本：

署長吳秀梅

TSCFA 台灣超臨界流體學會 興大登場

發稿時間：2023/10/30 10:29:53

(中央社訊息服務 20231030 10:29:53)TSCFA 台灣超臨界流體學會於 10 月 27 日假國立中興大學食品暨應用生物科技大樓舉行 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，由梁明在理事長主持。

台灣超臨界流體協會成立於 2004 年 6 月 23 日，即將邁進第 20 年，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。超臨界流體為業界公認的綠色化學技術之一，採用 CO2 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。各國陸續提出「2050 淨零排放」的宣示與行動，2050 淨零轉型是全世界的目標，為此綠色製程生產、節能減碳是刻不容緩的議題，可預見的，超臨界流體技術未來將持續在不同產業領域中蓬勃發展。

本次大會邀請國立中興大學食品暨應用生物科技學系謝昌衛特聘教授以食品產業淨零轉型趨勢與實務探討為題進行專題演講，並邀請亞果生醫股份有限公司陳韻茹研發經理及綠茵生技股份有限公司林育正研發經理 2 位業界專家分別以超臨界流體技術製備之膠原蛋白支架結構應用於再生醫學領域及超臨界流體於機能性保健食品萃取技術之應用為題目進行專題演講，內容專業精湛，與會貴賓獲益良多。

27 日上午召開大會，邀請國立中興大學農業暨自然資源學院院長黃紹毅教授及食品暨應用生物科技學系系主任蔣恩沛終身特聘教授親臨祝賀。下午進行論文發表，涵蓋「食品與生技醫療」、「能源與綠色製程」、「材料與精密製造」等三大類之口頭與海報論文發表共 14 篇，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。晚間舉辦年會晚宴及頒獎活動，為深具意義的年會活動劃下完美句點。

資料來源：https://www.cna.com.tw/postwrite/chi/355305

綠茵生技 GREENYN BIOTECHNOLOGY

JOIN US

R&D Team

研發人員

Job Description

- 保健食品原料R&D，新品專案提報與執行。
- 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

東聯化學股份有限公司

Oriental Union Chemical Corp.

秉持集團立業精神，創造資源永續價值

東聯化學股份有限公司成立於 1975 年，秉持誠信為最高經營原則，以踏實的精神建立內控管理及法規制度，並奠定自律嚴謹的治理文化，為東聯化學的立業之本。

東聯化學創立四十多年來，以生產環氧乙烷及乙二醇等相關化學產品為主，目前擁有臺灣高雄林園廠、子公司中國江蘇揚州二處生產基地，是亞洲地區的化學供應大廠。

東聯化學以生產優質產品、解決客戶問題為目標，於 1987 年在台灣證券交易所掛牌上市，為遠東集團旗下石化能源事業體之一。

氣體產品介紹

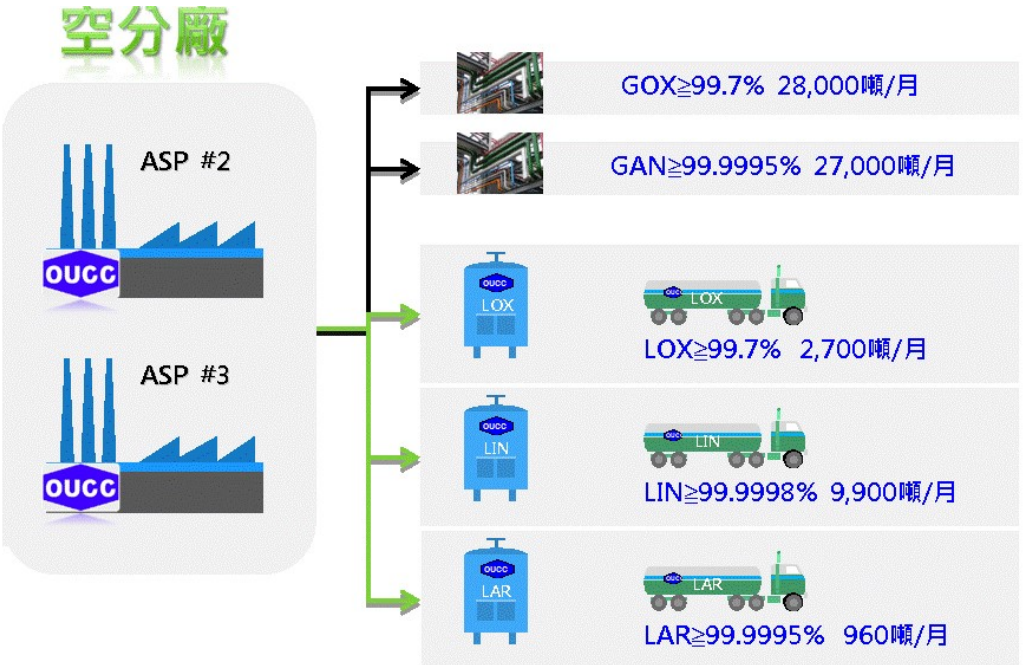
氣體產能：(台灣區)

- 氣體空分廠 2 座+液化機組 1 座：

  GN2+GO2 產能 65 萬噸/年，LN2+LO2+LO2 (M)+Lar 產能 17 萬噸/年；
- 二氧化碳廠 3 座：

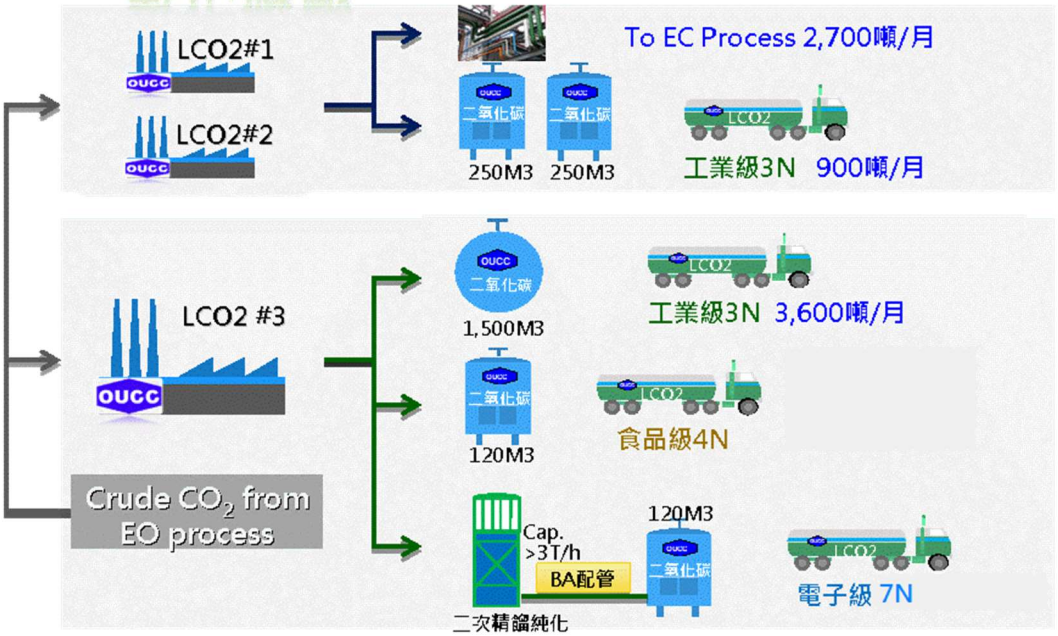
  LCO2 電子級 7N+食品級 4N +工業級 3N ，產能 8.6 萬噸/年；
- On site 製氮機組 3 座，產能 6.5 萬噸/年
- 冷鏈物流氣體應用創新產品。

工廠能力：



工廠能力 Capacity

二氧化碳廠



產品應用：

- 氧氣:石化工業、純氧燃燒、金屬切割、廢水處理、 焚化爐、醫院及漁業養殖業等。
- 氮氣: 煉油工業、電子及半導體、塑膠、食品冷凍及包裝、化工、金屬熱處理等。
- 氬氣: 焊接、太陽能業、電子及半導體業、金屬製造業等。
- 二氧化碳: 焊接、食品冷凍及包裝、電子及半導體業、碳酸飲料等。

立槽、配管及灌裝服務：

遠端液位監控系統：

本公司於全國所有客戶端，斥資安裝遠端監控系統，無線訊號傳輸，24 小時監測客戶端之產品庫存，主動補充庫存服務，全年無休。

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

(夜間班)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：**(夜班)112/11/20~11/30 18:30~21:30；12/2~12/3 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 11/20~12/03	
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

2023/11/20 (一)	18:30 ~ 21:30
2023/11/21 (二)	18:30 ~ 21:30
2023/11/22 (三)	18:30 ~ 21:30
2023/11/23 (四)	18:30 ~ 21:30
2023/11/27 (一)	18:30 ~ 21:30
2023/11/28 (二)	18:30 ~ 21:30
2023/11/29 (三)	18:30 ~ 21:30
2023/11/30 (四)	18:30 ~ 21:30
2023/12/02 (六)	08:00 ~ 17:00 (實習第 1 組)
2023/12/03 (日)	08:00 ~ 14:00 (實習第 1 組)

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：**112/11/20~11/24 08:00~17:00**；**11/23~11/24 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 11/20~11/24	
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

2023/11/20 (一)	08:00 ~ 17:00
2023/11/21 (二)	08:00 ~ 17:00
2023/11/22 (三)	08:00 ~ 17:00
2023/11/23 (四)	08:00 ~ 17:00 (實習第 1 組)
2023/11/24 (五)	08:00 ~ 14:00 (實習第 1 組)

Assessment of Part-Load Operation Strategies of Supercritical Power Cycles Using Carbon Dioxide Mixtures in CSP Plants, Including Air-Cooled Condenser Optimisation

評估 CSP 發電廠中使用二氧化碳混合物的超臨界動力循環的部分負載運行策略，包括風冷冷凝器優化

By Pablo Rodríguez-de Arriba, Francesco Crespi, David Sánchez Martínez, Lourdes García Rodríguez

University of Seville, Seville, Spain

Abstract

This manuscript, developed in the framework of SCARABEUS project, presents an assessment of the part-load performance of a transcritical Recompression cycle running on a 80%CO2-20%SO2 mixture under different load-control schemes.

The first part of the paper describes the computational platform of the integrated system, implemented in Thermoflex but with profuse use of in-house scripts, in order to accurately describe the off-design performance of key components when operating on CO2 mixtures with non-ideal gas behaviour. These off-design models make use of performance maps for turbomachinery — provided by the SCARABEUS partners — whereas the Conductance Ratio Method employed to model the counter-current heat exchangers is calibrated with in-house tools. The paper is specifically focused on the Heat Rejection Unit, for which a specific design tool accounting for accurate heat transfer between working fluid and cooling medium (air) and for auxiliary power consumption — both in off-design — has been developed by the authors.

In the second part of the paper, different operating strategies of the power cycle are considered, based on keeping one of the following three parameters constant: turbine inlet temperature, turbine outlet temperature or return temperature of molten salts. Globally, plant operation is constrained by the need to keep the temperature of cold HTF returning to the storage system as close as possible to its rated (design) value and by the need to keep turbine outlet temperature below 450°C to avoid the installation of an external cooling system in the low pressure section of this equipment. Therefore, the trade-off between these two parameters and system net efficiency are assessed in the paper. Regarding the Air-Cooled Condenser, the optimal operation

strategy of this component found to be based on a combination of Single-speed and Variable Frequency Driver fans.

The results show that the operation at constant turbine inlet temperature leads to the highest net efficiency of the power block, closely followed by the control scheme based on constant return temperature of the heat transfer fluid. Nevertheless, this latter option enables a perfect control on the other two figures of merit. As a consequence, the identification of the best operation strategy must be addressed in future works by means of a thorough techno-economic assessment considering the annual yield of the plant.

資料來源：https://doi.org/10.1115/GT2023-103665

Eugenol isolated from supercritical fluid extract of *Ocimum sanctum*: a potent inhibitor of DENV-2

從聖羅勒超臨界流體萃取物中分離出的丁香酚：DENV-2 的有效抑制劑

By **Sulochana Kaushik, Samander Kaushik, Lalit Dar & Jaya Parkash Yadav**

Department of Genetics, Maharshi Dayanand University, Rohtak, 124001, Haryana, India

Abstract

Dengue is one of the fairly prevalent viral infections at the world level transmitted through mosquitoes (*Aedes aegypti* and *Aedes albopictus*). Due to various environmental factors, dengue cases surged rapidly at the global level in recent decades, with 193245 cases in 2021 and an increment of 110473 cases in 2022. There is no antidote available against dengue and other *flaviviruses*. In the absence of a dengue vaccine or specific antiviral, medicinal plants or their products can be the only choice for its effective management. *Ocimum sanctum* is known as ‘‘The Incomparable One,’’ ‘‘Mother Medicine of Nature’’ and ‘‘Queen of Herbs’’ in Ayurveda, and is considered an "elixir of life" supreme in both healthcare and spiritual terms. In present study eugenol was isolated in *O.sanctum.* Eugenol (1-hydroxy-2-methoxy-4-allylbenzene) has been substantially responsible for its therapeutic potential. High-performance thin-layer chromatography, Fourier transform infrared spectroscopy and ultraviolet–visible spectroscopy were applied to identify the compound. The Rf value of isolated compound was same in the chromatogram (0.69 + 0.05) with compare to standard. The safe dose of plant and eugenol were found as < 31.25 µg/ml and < 15.62 µg/ml. The anti-dengue activity was assessed in C6/36 cell lines, their effect was determined through Quantitative PCR. The NMR of the isolated eugenol showed similar properties as the commercial marker compound. The eugenol and SFE extract of *O. sanctum* showed the inhibition of 99.28% and completely against Dengue-2, respectively. Docking study exposed that the interaction of eugenol with NS1 and NS5 dengue protein showed the binding energy as − 5.33 and − 5.75 kcal/mol, respectively. The eugenol from the *O. sanctum* plant has the potential to be a good source of future treatment medications for dengue illness, as well as a valuable tool in its successful management

資料來源：https://amb-express.springeropen.com/articles/10.1186/s13568-023-01607-x

Physics-Informed Deep Learning-Based Proof-of-Concept Study of a Novel Elastohydrodynamic Seal for Supercritical CO_2 Turbomachinery

基於物理知識的深度學習超臨界 CO_2 渦輪機械 新型彈性流體動力密封的概念驗證研究

By **Karthik Reddy Lyathakula, Sevki Cesmeci, Matthew DeMond, Mohammad Fuad Hassan, Hanping Xu, Jing Tang**

Department of Mechanical Engineering, Georgia Southern University, Statesboro, GA 30458

Abstract

Supercritical carbon dioxide (sCO_2) power cycles show promising potential of higher plant efficiencies and power densities for a wide range of power generation applications such as fossil fuel power plants, nuclear power production, solar power, and geothermal power generation. sCO_2 leakage through the turbomachinery has been one of the main concerns in such applications. To offer a potential solution, we propose an elastohydrodynamic (EHD) seal that can work at elevated pressures and temperatures with low leakage and minimal wear. The EHD seal has a very simple, sleeve-like structure, wrapping on the rotor with minimal initial clearance at micron levels. In this work, a proof-of-concept study for the proposed EHD seal was presented by using the simplified Reynolds equation and Lame's formula for the fluid flow in the clearance and for seal deformation, respectively. The set of nonlinear equations was solved by using both the conventional Prediction–Correction (PC) method and modern Physics-Informed Neural Network (PINN). It was shown that the physics-informed deep learning method provided good computational efficiency in resolving the steep pressure gradient in the clearance with good accuracy. The results showed that the leakage rates increased quadratically with working pressures and reached a steady-state at high-pressure values of 15~20 MPa, where Q = 300 g/s at 20 MPa for an initial seal clearance of 255 μm. This indicates that the EHD seal could be tailored to become a potential solution to minimize the sCO_2 discharge in power plants.

Keywords: sCO_2, deep learning, physics-informed neural networks, PINN, alternative energy resources, power (co-) generation, energy conversion/systems, energy systems analysis, seal, sealing, gas leakage

資料來源： https://doi.org/10.1115/1.4063326

Solubility measurement of verapamil for the preparation of developed nanomedicines using supercritical fluid

使用超臨界流體製備開發的奈米藥物時維拉帕米的溶解度測量

By **Nadia Esfandiari, Nedasadat Saadati Ardestani, Ratna Surya Alwi, Adrián Rojas, Chandrasekhar Garlapati & Seyed Ali Sajadian**

Department of Chemical Engineering, Marvdasht Branch, Islamic Azad University, Marvdasht, Iran

Abstract

A static method is employed to determine the solubilities of verapamil in supercritical carbon dioxide (SC-CO_2) at temperatures between 308 and 338 K and pressures between 12 and 30 MPa. The solubility of verapamil in SC-CO_2 expressed as mole fraction are in the range of 3.6×10^{-6} to 7.14×10^{-5}. Using four semi-empirical density-based models, the solubility data are correlated: Chrastil, Bartle, Kumar–Johnston (K–J), and Mendez-Santiago and Teja (MST), two equations of state (SRK and PC-SAFT EoS), expanded liquid models (modified Wilson's models), and regular solution model. The obtained results indicated that the regular solution and PC-SAFT models showed the most noteworthy exactness with *AARD%* of 1.68 and 7.45, respectively. The total heat, vaporization heat, and solvation heat of verapamil are calculated at 39.62, 60.03, and − 20.41 kJ/mol, respectively. Regarding the poor solubility of verapamil in SC-CO_2, supercritical anti-solvent methods can be an appropriate choice to produce fine particles of this drug.

資料來源：https://www.nature.com/articles/s41598-023-44280-7

Structures and transport properties of supercritical SiO2-H2O and NaAlSi3O8-H2O fluids

超臨界 SiO2-H2O 和 NaAlSi3O8-H2O 流體的結構和輸運特性

By **Yicheng Sun; Xiandong Liu; Xiancai Lu**

State Key Laboratory for Mineral Deposits Research, School of Earth Sciences and Engineering, Nanjing University, Nanjing, Jiangsu 210023, China

Abstract

Speciation and transport properties of supercritical fluids is critical for understanding their behavior in the Earth's interior. Here, we report a systematic first principles molecular dynamics simulation study of the structure, speciation, self-diffusivity (D), and viscosity (η) of SiO_2 melt, $NaAlSi_3O_8$ melt, SiO_2-H_2O and $NaAlSi_3O_8$-H_2O fluids at 2000–3500 K with 0–70 wt% H_2O. Our calculations show that as the water content increases, the proportion of Q^0 species (Q^n species, where n is the number of bridging oxygens in an individual Si/Al-O polyhedra) increases while Q^4 decreases. The proportions of Q^1, Q^2, and Q^3 species first increase and then decrease with increasing water content. The diffusivity sequence for the supercritical SiO_2-H_2O fluids is $D_H > D_O > D_{Si}$, and for the supercritical $NaAlSi_3O_8$-H_2O fluids, on the whole, is $D_{Na} \approx D_H > D_O > D_{Al} \approx D_{Si}$. The viscosities of the two systems decrease drastically at the beginning of the increase in water content, and then decrease slowly. We demonstrate that the exponential decrease in the viscosity of polymerized silicate melt with increasing water content is due to a sharp decrease in the proportion of Q^4 species and increase in Si-O-H. The typical structural feature of supercritical fluid is that it contains a large amount of easy-to-flow partially polymerized or depolymerized protonated silicate units, which leads to a low viscosity while being enriched in silicate. This feature provides supercritical fluids the potential to transport elements that are hard to migrate in aqueous fluids or hydrous silicate melts, such as high field strength elements.

資料來源：https://doi.org/10.2138/am-2022-8724

Supercritical Carbon Dioxide Utilization for Hydraulic Fracturing of Shale Reservoir, and Geo-Storage: A Review

利用超臨界二氧化碳於頁岩油藏水力壓裂與地質封存之文獻回顧

By **Nikita Gupta and Amit Verma***

Department of Petroleum Engineering, School of Energy Technology, Pandit Deendayal Energy University, Gandhinagar, Gujarat 382007, India

Abstract

Hydraulic fracturing has completely revolutionized how shale resources are exploited to extracthydrocarbons. However, sustainability and environmental issues have fueled the desire for alternate fracturing technologies. Supercritical carbon dioxide (Sc-CO_2) fracturing is a new method that uses high-pressure, high-temperature CO_2 in its supercritical state (7.38 MPa and 31.1 °C) to generate fractures in shale formations, thereby increasing reservoir permeability. This Review thoroughly analyzes the effects of Sc-CO_2 on shale reservoirs during the fracturing process, including the factors that affect fracture breakdown pressure and the complexity and roughness of fracture induced by Sc-CO_2. Sc-CO_2 can fracture rock at a fracturing pressure lower than that of slick water. CO_2, in its supercritical state, shows strong permeability, low viscosity, and extremely low surface tension, like gas, because of which it can infiltrate any space larger than its kinetic diameter (0.330 nm). Many research investigations illustrate how Sc-CO_2 affects shales with diverse pore structures, mineral compositions, and mechanical properties when exposed to Sc-CO_2 for several hours to days. It is challenging to effectively store CO_2 in shale gas reservoirs due to their low permeability and limited storage capacity. To improve the effectiveness of CO_2 storage, shale can be fractured to increase the pore space and surface area in reservoirs. Thereby, a certain amount of the CO_2 pumped for shale gas production can be securely stored in shale formations, reducing carbon emissions and allowing for a zero-carbon footprint. This paper discusses the pathway and different chemical reactions involved in the storage of CO_2 after fracturing over a period. However, fully understanding the interactions between Sc-CO_2 and shale rock and the possibility of long-term storage of CO_2 in shale formations is quite challenging. It is because of a lack of research and limited knowledge in the above field. Hence, more investigation and development are required in the research area of Sc-CO_2 fracturing and the interaction of CO_2 with shale rock.

資料來源：https://doi.org/10.1021/acs.energyfuels.3c02399

The Approach of Pressure Enthalpy Phase Diagram in Supercritical CO_2 Pipeline Design

以壓力焓相圖作超臨界 CO_2 管路設計之方法

By **Wisnu W. Ginting; Doli H. Bragoba; Carolina V. Barreto; Gustavo A. Carvalho; Caio S. Ramos**

University of Southern California, 3620 A McClintock Avenue, Suite 265, Los Angeles, California 90089-2921, USA.

Abstract

The numerical modeling of carbon capture, utilization and storage (CCUS) systems can present a large amount of challenges. Mixtures with high CO_2 content demand special attention regarding the thermodynamic and hydrodynamic modeling, especially if the system's pressure and temperature operational conditions reach values below the critical point, leading to a two-phase flow.

In this paper, a base case for a typical onshore injection well was proposed to numerically investigate different operational conditions, including steady-state and transient scenarios. Different analyses have been made using ALFAsim, a 1D multiphase flow simulator developed by ESSS (ESSS, 2019). Parametric analyses were performed on steady-state scenarios to investigate the optimum pipeline and wellbore diameters respecting the erosional velocity of American Petroleum Institute (API). Also, a transient scenario was simulated using a formulation based on pressure-enthalpy (PH), leading to an energy conservation equation with enthalpy as primary variable, and the use of PH fluid properties table, generated in RF-DAP FASE, a fluid analysis and simulation software (ESSS, 2022). The objective of these analyses is to show that high CO_2 content mixtures add complexity to the simulations, mainly if the operational conditions lead to the development of a second phase.

The parametric study could address the optimum pipeline and wellbore diameters design with respect to the system's regulation requirements. Furthermore, the transient analysis shows a formation of vapor and liquid phases on a CO_2 mixture during a shut-in, which could be considered crucial information to properly design the materials and equipment of the system.

Keywords: pvt measurement, brazil government, CO_2, enhanced recovery, upstream oil & gas, subsurface storage, pipeline, simulation, transition, diagram

資料來源：https://doi.org/10.2118/215207-MS