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

電子報第 180 期

活動訊息

◆ ***論文徵稿***

即日起徵求SuperGreen2022論文，主題：

(1)**“Physicochemical properties and thermodynamics”**

(2)**“Natural products, pharmaceutical and biomedical applications”**

(3)**“Reactions, material design and nanotechnology”**

(4)**“Processes intensification, CO_2 utilization and industrial applications”**

等4大主題領域的研究論文，邀請各界踴躍投稿，及蒞臨與會交流。

https://supergreen2022.conf.tw/site/page.aspx?pid=901&sid=1429&lang=en

專家介紹

◆ 吳佳娟副教授(中國醫藥大學營養學系)

◆ 魏肇怡副總經理(亞果股份有限公司)

團體會員介紹

◆ 易度企業股份有限公司

教育訓練班

◆ (在職)高壓氣體特定設備操作人員安全衛生在職教育訓練 04/08(一)

◆ (夜間班)高壓氣體特定設備操作人員安全衛生教育訓練班 04/12~04/24

產業新聞

◆ 東聯高純度二氧化碳 首度打入台積電先進製程供應鏈

資料來源：https://news.cnyes.com/news/id/4794713

技術文摘

◆ Combined ionic liquid and supercritical carbon dioxide based dynamic extraction of six cannabinoids from Cannabis sativa L 離子液體和超臨界二氧化碳的組合動態提取大麻中六種大麻素

◆ Intensified green-based extraction process as a circular economy approach to recover bioactive compounds from soursop seeds (Annona muricata L.) 強化綠色提取工藝作為一種循環經濟方法從刺槐種子中回收生物活性化合物(Annona muricata L.)

◆ Novel insights on extraction and encapsulation techniques of elderberry bioactive compounds 接骨木生物活性化合物提取膠囊化技術的新見解

- Selective extraction of antimicrobial agents from Jodina rhombifolia by supercritical fluid carbon dioxide: phytochemical profile 超臨界流體二氧化碳選擇性提取菱葉菊中的抗菌劑：植物化學特徵
- Supercritical fluids and fluid mixtures to obtain high-value compounds from Capsicum peppers 超臨界流體和流體混合物從辣椒中獲得高價值化合物
- Sustainable utilization of food waste for bioenergy production: A step towards circular bioeconomy 從廚餘產製生物能源之永續利用：邁向循環生物經濟的一步

台灣超臨界流體協會
電話：(07)355-5706
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12th International Conference on Supercritical Fluid (Supergreen 2022) Abstract Template

Author 1[a], Author 2[b,*]

[a]Author's affiliation, City, Country

[b]Author's affiliation, City, Country

*Corresponding author: E-mail address

This is the abstract template for the 12th International Conference on Supercritical Fluid (Supergreen 2022). Please follow these instructions to prepare your abstract.

1) Page format

Prepare **one page** abstract in **A4-size**. Top, bottom, right and left margins are set to **25.4 mm**. 'Times New Roman' or similar fonts are used throughout the abstract.

2) Title

Title should be **centered** and presented in **14 pt, bold** with a fixed line spacing of **20 pt**. Leave one-line space after the title. The first letter of words in title should be capitalized except for articles, short prepositions, and conjunctions.

3) Author name(s)

Author name(s) are centered and presented in **12 pt** with a fixed line spacing of **20 pt**. The corresponding author should be labelled with '*' and the presenting author should be underlined.

4) Affiliation(s)

Affiliations are centered and presented in **10 pt** with a fixed line spacing of **20 pt**. Leave one-line space after the affiliation.

5) Abstract

Abstract is presented in **12 pt** with a fixed line spacing of **20 pt**. The text should be **justified left and right**. Figures and tables could be included in the abstract with the sequential numbering. All figures and tables are accompanied with a caption.

專家介紹

【中國醫藥大學營養學系 吳佳娟副教授】

❖學術專長：保健營養成份之萃取與純化、超臨界流體技術應用於保健食品、臨床營養

❖email：jjwu@mail.cmu.edu.tw

吳佳娟副教授畢業於靜宜大學食品營養系，獲學士與碩士學位，之後取得國立中興大學化學工程學系博士學位。1987 年擔任中國醫藥學院北港附設醫院營養師，1990 年擔任中國醫藥大學營養學系助教，2001 年擔任中國醫藥大學營養學系講師，2011 年擔任中國醫藥大學營養學系助理教授，並於 2017 年升等為副教授。

吳佳娟副教授長期從事營養學與保健食品等相關研究，已發表學術論文近 30 篇於國際期刊，並在台灣出版 5 本營養相關書藉，除了營養學，吳副教授在超臨界流體技術應用於保健食品的萃取和純化，也在國內外的研討會上發表多篇論文，更陸續開發不少新技術，獲得許多相關的發明專利，包含超臨界流體抗溶結晶產製高純度咖啡酸苯乙酯微奈米粉的方法、從杜沙藻製備 9-順式-β-胡蘿蔔素及反式-β-胡蘿蔔素之方法、高分子材料包覆蜂膠類黃酮微米粉體之方法、從成熟山苦瓜假種皮製備茄紅素之方法等。

吳佳娟副教授曾參與本會論文評選活動，獲得第二屆以及第八屆台灣超臨界流體技術研究優良論文獎。吳副教授主要授課的課程為：膳食計畫與實驗、營養諮商技巧、中國營養學、服務學習等，透過服務學習使學生能了解服務的涵義、尊重不同文化，進而培養學生的自我反省能力、能為別人著想及擁有感恩的心，並在執行團體服務的反思，能有更深的體會與迴響。

專家介紹

【亞果生醫股份有限公司 魏肇怡產品技術處副總】

❖專長：超臨界流體萃取、純化、合成技術之應用設計組裝及操作

❖email：joey@acrobiomedical.com

魏肇怡副總求學與工作資歷總是不小心與超臨界流體技術相關，不論是萃取分離、分餾層析、酯化合成，設備設計組裝、實地操作、技術簡報到超臨界流體技術實習教學，幾乎都有涉獵一二。1999 年四技畢業後的研究助理工作，開始接觸超臨界萃取設備組裝；2001 年碩士時，研習超臨界的酵素催化酯化反應與相平衡溶解度研究；2003 年研究所畢業後，在綠益康生物科技實業股份有限公司擔任技術總監，做超臨界中草藥的萃取與純化分餾，發明申請以超臨界酒的熟成技術專利；2005 年在職進修博士班，研究超臨界甲醇酯化合成生質柴油和超臨界二氧化碳分餾純化生質柴油，發表論文並申請取得生質柴油製造方法專利，2014 年博士班畢業後，到超康生技股份有限公司擔任廠長，同樣做超臨界萃取分餾合成的技術應用，2009-2016 年博士班與工作之餘，還到南華大學自然生物科技系擔任兼任講師的教學工作，緊接在 2014 年到目前工作的亞果生醫股份有限公司擔任生產部經理，以超臨界二氧化碳清洗豬組織，純化保留膠原蛋白的支架結構作醫材產品的應用，參與多項專利申請，在工作資歷和技術經驗上持續累積精進。

期待未來秘書處能邀請魏副總前來年度研討會，與會員朋友們分享相關知識及研究，讓與會者能共同切磋和學習。

易度企業股份有限公司

關於易度

臺灣易度企業自 1989 年 8 月設立起，從事表面處理設備製作與開發研究工作，秉持著堅強團隊陣容，以最專業、最優秀品質，創造最理想設備，這十幾年的成長過程中，不斷精益求精，期間榮獲振動電鍍裝置、電鍍滾桶改良構造等五項專利，並獲得德國大廠 KISSLER、LPW & BLASBEGR 之技術轉移。

多年來在各種產業之表面處理設備製作、製程深耕之經驗成果，提供各種製程專用之自動化表面處理設備，並引進歐洲先進技術，在台製造銷售，期使本土產業能以台製價格，享受歐洲高品質、高效能之處理設備。設備之設計除考慮製程之高良率、高效率外，亦設計節水、減廢之功能。以認真用心的設計、技術上的突破、深厚的硬體製作經驗及完善的程式控制，給予客戶最佳的生產設備，成為**臺灣唯一榮獲經濟部工業局評鑒電鍍工業優良標誌廠商**。

企業名稱由來

「易度」各字義有不同含義，而這些內涵是易度企業文化的重要準則

「易」的字義有變異、不易及容易三個層面。變異代表變動快速的意思，延伸成為企業的靈活快速迎合市場需求及變動。不易另外可解釋為不變的意思，做為一個企業需要一個赤子之心並隨時警惕自己勿忘初心。容易代表簡單的意思，我們為客戶提供化繁為簡的解決方案一直視為企業自豪的精緻服務。

「度」的字義有衡量、尺寸的含意也可以象徵精準量度的意思，延伸成為精準的做事態度及方法。

企業定位：從電鍍設備到廢水處理為客戶作最完善的精緻服務。

產品定位：不是為環保局的罰單作環保，而是要為世世代代的子孫作保育。

產品：

- 五金、汽車業、航太、塑膠電鍍、裝飾電鍍、電子
- 手動設備、吊鍍設備、迴轉電鍍、連續電鍍、微電鑄、實驗設備、滾鍍設備、廢水設備、廢氣設備

主要設備及服務：

聯絡資訊：

地址：桃園市龍潭區高楊北路 106 巷 85 號

電話：(03)411-7983

信箱：sales@eidorado.com.tw

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

高壓氣體特定設備操作人員安全衛生在職教育訓練

需要有操作證照的單位，歡迎向協會報名。

- ●上課日期：**111/04/08(五) 13:30~16:30**
- ●上課時數：3 小時
- ●課程內容：高壓氣體特定設備相關法規、職災案例探討預防、安全須知及自動檢查
- ●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　產業力發展組】(由北側門學員專屬通道進入)
- ●參加對象：高壓氣體特定設備操作人員安全衛生訓練**結業滿三年者，需有結業証書**。
- ●費　　用：本班研習費**新台幣 400 元整**。
- ●名　　額：每班 30 名，額滿為止。
- ●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在職教育訓練			上課日期	111 年 04 月 08 日	
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。〔！〕

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)111/04/12~04/21 18:30~21:30；04/23~04/24 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】(由北側門學員專屬通道進入)

●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	111 年 04/12~04/24	
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：(夜間班)高壓氣體特定設備操作人員安全衛生教育訓練班

2022/04/12 (二)	18:30 ~ 21:30
2022/04/13 (三)	18:30 ~ 21:30
2022/04/14 (四)	18:30 ~ 21:30
2022/04/15 (五)	18:30 ~ 21:30
2022/04/18 (一)	18:30 ~ 21:30
2022/04/19 (二)	18:30 ~ 21:30
2022/04/20 (三)	18:30 ~ 21:30
2022/04/21 (四)	18:30 ~ 21:30
2022/04/23 (六)	08:00 ~ 17:00 (實習第 1 組)
2022/04/24 (日)	08:00 ~ 14:00 (實習第 1 組)

東聯高純度二氧化碳 首度打入台積電先進製程供應鏈

2022/02/09 鉅亨網記者林薏茹

隨著半導體往先進製程推進，對化學品的精度要求與需求量也更大，東聯 (1710-TW) 回收 EG(乙二醇) 製程中產生的二氧化碳，產製高純度二氧化碳，純度等級達 99.9999%，可供應 5 奈米、3 奈米等先進製程需求，首度直接打入晶圓代工龍頭台積電 (2330-TW) 供應鏈，今年下半年新廠完工後，就可開始量產出貨。

東聯主力產品為 EG，由於 EG 生產過程中會產生二氧化碳，東聯超前部署碳中和趨勢，在生產 EG 的同時，也進行二氧化碳回收，目前回收率已達 8 成。

不過，半導體製程對二氧化碳的純度、品質要求比化工產業更高，過去國內晶圓代工廠對二氧化碳的純度要求約 99.999%，供應商多為小型氣體廠，但隨著半導體朝更先進製程推進，對二氧化碳純度的要求也進一步提升至「6 個 9」、即 99.9999%。

東聯透過自身碳捕捉循環再利用製程，產製高純度二氧化碳，以搶進半導體先進製程化學品市場。東聯表示，所生產的高純度二氧化碳，符合 5 奈米、3 奈米等先進製程需求，加上先進製程對相關二氧化碳需求量大，公司已在建置新產線，初期規劃月產能 1000 噸，預計下半年投產。

歐盟碳關稅將於 2026 年上路，未來產品需有碳足跡、或是低碳排放相關認證，才能做歐洲市場的生意。而東聯透過碳捕捉循環再利用製程，除有助減少碳足跡外，也能藉此切入半導體化學品供應鏈，一舉兩得。

因應碳中和趨勢，東聯近年來積極發展循環經濟，除碳捕捉再利用製程外，也回收製程中的廢棄物，再加工創造價值，並轉型朝特化市場佈局，盼擺脫過去 EG 身為大宗產品，以追求數量與降低成本為最高作戰原則的模式。

資料來源：https://news.cnyes.com/news/id/4794713

Combined ionic liquid and supercritical carbon dioxide based dynamic extraction of six cannabinoids from Cannabis sativa L

離子液體和超臨界二氧化碳的組合動態提取大麻中六種大麻素

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Abstract：

The potential of supercritical CO_2 and ionic liquids (ILs) as alternatives to traditional extraction of natural compounds from plant material is of increasing importance. Both techniques offer several advantages over conventional extraction methods. These two alternatives have been separately employed on numerous ocassions, however, until now, they have never been combined for the extraction of secondary metabolites from natural sources, despite properties that complement each other perfectly. Herein, we present the first application of an IL-based dynamic supercritical CO_2 extraction of six cannabinoids (CBD, CBDA, Δ9 -THC, THCA, CBG and CBGA) from industrial hemp (Cannabis sativa L.). Various process parameters were optimized, i.e., IL-based pre-treatment time and pre-treatment temperature, as well as pressure and temperature during supercritical fluid extraction. In addition, the impact of different ILs on cannabinoid extraction yield was evaluated, namely, 1-ethyl-3-methylimidazolium acetate, choline acetate and 1-ethyl-3-methylimidazolium dimethylphosphate. This novel technique exhibits a synergistic effect that allows the solvent-free acquisition of cannabinoids from industrial hemp, avoiding further processing steps and the additional use of resources. The newly developed IL-based supercritical CO_2 extraction results in high yields of the investigated cannabinoids, thus, demonstrating an effective and reliable alternative to established extraction methods. Ultimately, the ILs can be recycled to reduce costs and to improve the sustainability of the developed extraction process.

Intensified green-based extraction process as a circular economy approach to recover bioactive compounds from soursop seeds (Annona muricata L.)

強化綠色提取工藝作為一種循環經濟方法從刺槐種子中回收生物活性化合物(Annona muricata L.)

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Abstract：

Soursop (Annona muricata L.) seeds, which is a residue obtained from juice agro-industries, were subjected to supercritical fluid extraction (SFE) and subcritical water extraction (SWE) in single or combined mode to extract the potential value-added compounds. Different extraction methods were evaluated in terms of the extraction yield, phenolics content, antioxidant activity (DPPH, ABTS, and FRAP), and Maillard reaction products. The extracts were analyzed using SEM, GC-MS, and LC-MS/MS techniques. The temperature and a combination of high-pressure techniques positively affected the overall results (SFE + SWE), affording nonpolar and polar extracts rich in phenolics and antioxidant compounds. SEM analysis showed that the use of SFE caused modifications in the cell wall, and the oil fraction was rich in fatty acids. Twenty-nine compounds associated with soursop seed extracts were detected for the first time using LC-MS/MS, showing the potential of the raw material as well as promoting resource re-utilization in circular economy.

Keywords：Annona muricata seeds, Supercritical fluid extraction, Subcritical water extraction, Phenolic compounds, Antioxidant activity, Principal component analysis

Novel insights on extraction and encapsulation techniques of elderberry bioactive compounds

接骨木生物活性化合物提取膠囊化技術的新見解

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Abstract：

BACKGROUND: Elderberry (Sambucus nigra L .) has been used in traditional medicine and as a supplement in many beverages and meals. Elderberry is a good source of bioactive flavonoids like quercetin, kaempferol, and rutin, as well as other phenolic compounds. Extraction techniques significantly influence the efficiency of extraction of bioactive compounds. Green chemistry elements such as safety, environmental friendliness, run-down or at least minimal contaminants, efficiency, and economic criteria should all be addressed by an effective bioactive extraction process. Furthermore, micro/nanoencapsulation technologies are particularly effective for increasing bioavailability and bioactive component stability.

SCOPE AND APPROACH: This review article comprehensively describes new developments in elderberry extraction and encapsulation. Elderberry is largely employed in the food and pharmaceutical industries due to its health-promoting and sensory characteristics. Elderberry has traditionally been used as a diaphoretic, antipyretic, diuretic, antidepressant, and antitumor agent in folk medicine.

KEY FINDINGS AND CONCLUSIONS: Conventional extraction methods (e.g. maceration and Soxhelt extraction) as well as advanced green techniques (e.g. supercritical fluids, pulsed electric field, emulsion liquid extraction, microwave, and ultrasonic extraction) have been used to extract bioactives from elderberry. Over the other protective measures, encapsulation techniques are particularly recommended to protect the bioactive components found in elderberry. Microencapsulation (spray

drying, freeze drying, extrusion, emulsion systems) and nanoencapsulation (nanoemulsions, solid lipid nanoparticles and nanodispersions, nanohydrogels, electrospinning, nano spray drying) approaches for elderberry bioactives have been examined in this regard.

Keywords：elderberry, Sambucus nigra, extraction, encapsulation, anthocyanins, berries

Selective extraction of antimicrobial agents from Jodina rhombifolia by supercritical fluid carbon dioxide: phytochemical profile

超臨界流體二氧化碳選擇性提取菱葉菊中的抗菌劑：植物化學特徵

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Abstract：

The goals of this study were to determine the phytochemical profile of *Jodina rhombifolia* and to evaluate the ability of supercritical fluids ($ScFCO_2$) to selectively extract the metabolites responsible for the bioactivity. This species has simple aromatic compounds and lignan monomers, as well as glycerides containing epoxidized saturated fatty acids. Regarding the extraction by $ScFCO_2$, the extracts showed a higher antimicrobial activity against human pathogenic strains, with respect to the ethanolic extracts obtained from plant residues after extraction by $ScFCO_2$. Furthermore, the bioactive compounds were concentrated in just 1% P/P of the weight of the dry plant material. Extraction by $ScFCO_2$ was carried out under different conditions of pressure and temperature, with the best results being obtained at 30 °C and 30 MPa. The results obtained demonstrate the advantages of $ScFCO_2$ extractions over classical solvent extractions, in terms of improved safety and the ability to selectively extract the compounds of interest.

Supercritical fluids and fluid mixtures to obtain high-value compounds from Capsicum peppers

超臨界流體和流體混合物從辣椒中獲得高價值化合物

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Abstract：

Peppers of the Capsicum genus have a rich nutritional composition and are widely consumed worldwide. Thus, they find numerous applications in the food, pharmaceutical and cosmetic industries. One commercial application is oleoresin production, a nonpolar fraction rich in bioactive compounds, including capsaicinoids and carotenoids. Among the technologies for pepper processing, special attention is given to supercritical fluid technologies, such as supercritical fluid extraction (SFE) with pure solvents and CO_2 plus modifiers, and SFE assisted by ultrasound. Supercritical fluid-based processes present advantages over the classical extraction techniques like using less solvents, short extraction times, specificity and scalability. In this review, we present a brief overview of the nutritional aspects of peppers, followed by studies that apply supercritical fluid technologies to produce extracts and concentrate bioactives, besides oleoresin encapsulation. Furthermore, we present related phase equilibrium, cost estimation, and the gaps and needs for the full use of peppers from a sustainable perspective.

Keywords：Hot peppers, Supercritical fluid extraction, Pressurized liquid extraction, Capsaicinoids Carotenoids

Sustainable utilization of food waste for bioenergy production: A step towards circular bioeconomy

從廚餘產製生物能源之永續利用：邁向循環生物經濟的一步

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Abstract：

The population growth, along with lifestyle changes, has resulted in unprecedented levels of food waste at all phases of the supply chain, including harvest, packing, transportation, and consumption. Conventional practices involve dumping of food waste with municipal garbage. However, these methods have serious environmental and health consequences. Food waste has a great recycling perspective due to its high biodegradability and water content, making it an ideal substrate for the production of biofuels and other industrially important chemicals including pigments, enzymes, organic acids, and essential oils. This review extensively covers conversion of food waste to generate bioenergy which will help to reduce environmental pollution and facilitate implementation of a circular bioeconomy. Moreover, review also highlights novel technologies like supercritical fluid extraction, ultra-sonication, pressurized liquid extraction, and microwave assisted extractions that are being employed in food waste management to increase the efficiency of value-added product recovery in an economically viable manner. Metabolic engineering of microorganisms for specificity of product would be a future breakthrough in food waste valorization/management.

Keywords：Food waste, Circular bioeconomy, Biofuels, Fine chemicals, Green technology