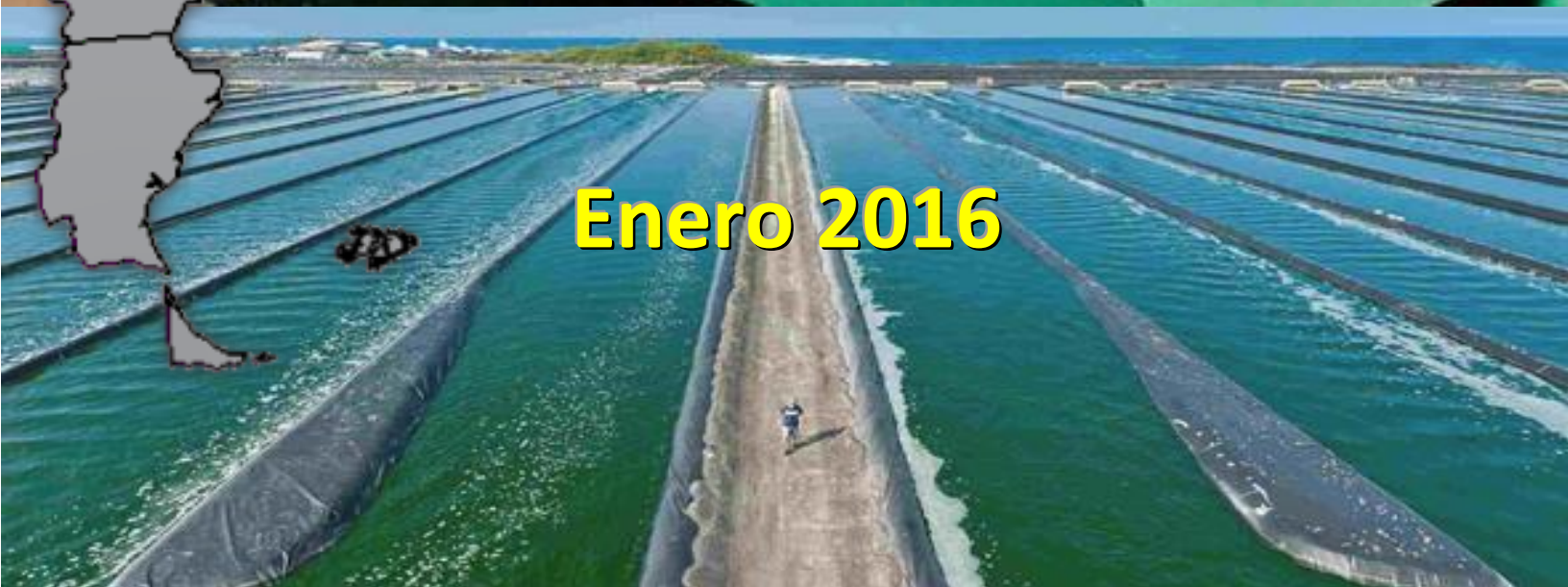
Unidad de Vigilancia Tecnológica e Inteligencia Competitiva

Microalgas

2° Boletín



Enero 2016

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Publicaciones

En esta sección del presente boletín se presentan las publicaciones de las ramas del árbol seleccionadas para esta edición.

Las ramas son:
BioProcesos-Cultivo-Piletones
BioProcesos-Cultivo-Biorreactor/FBR
BioProcesos-Cultivo-Heterotrófico
BioProcesos-Cosecha-Floculación
BioProcesos-Cosecha-Flotación
BioProcesos-Cosecha-Filtración
BioProcesos-Secado
BioProcesos-Extracción-Soxhlet
BioProcesos-Extracción-Supercrítica

Referente a BioProcesos-Cultivo-Piletones

Modeling of photosynthesis and respiration rate for Isochrysis galbana (T-Iso) and its influence on the production of this strain

Fecha de Publicación: Marzo 2016
Fuente: Bioresource Technology, Volume 203
Autor(es): Davide Ippoliti, Cintia Gómez, María del Mar Morales-Amaral, Rossella Pistocchi, J.M. Fernández-Sevilla, F. Gabriel Acién
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0960852415016806%26_version%3D1%26md5%3D3c5a9ec155ee3e33bbbe36c493ab5ecc

Abstract

Isochrysis galbana is a widely-used strain in aquaculture in spite of its low productivity. To maximize the productivity of processes based on this microalgae strain, we have developed a model considering the influence of irradiance, temperature, pH and dissolved oxygen concentration on the photosynthesis and respiration rate. Results demonstrate that this strain tolerates temperatures up to 35°C but it is highly sensitive to irradiances higher than 500$\mu Em^{-2} s^{-1}$ and dissolved oxygen concentrations higher than 11mgl^{-1}. We have validated the developed model using data from an industrial-scale outdoor tubular photobioreactor demonstrating that inadequate temperature and dissolved oxygen concentrations reduce productivity to half that

which is maximal, according to light availability under real outdoor conditions. The developed model is a useful tool for managing working processes, but especially in the development of new processes based on this strain and to take decisions regarding optimal control strategies.

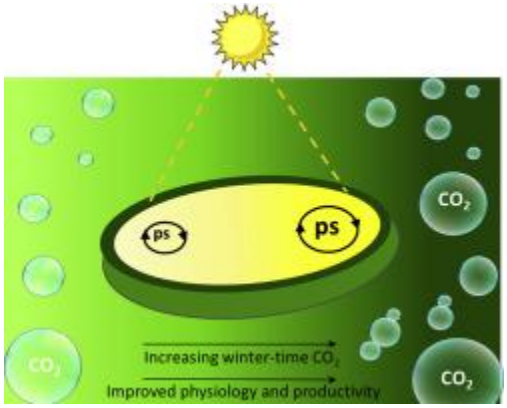
Winter-time CO2 addition in high rate algal mesocosms for enhanced microalgal performance

Fecha de Publicación: 1 Febrero 2016
Fuente: Water Research, Volume 89
Autor(es): Donna L. Sutherland, Valerio Montemezzani, Abbas Mehrabadi, Rupert J. Craggs
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0043135415304024%26_version%3D1%26md5%3Dc96070dca14e2a439a1825762a2dceba

Abstract

Carbon limitation in domestic wastewater high rate algal ponds is thought to constrain microalgal photo-physiology and productivity and CO2 augmentation is often used to overcome this limitation in summer. However, the implications of carbon limitation during winter are poorly understood. This paper investigates the effects of 0.5%, 2%, 5% and 10% CO2 addition on the winter-time performance of wastewater microalgae in high rate algal mesocosms. Performance was measured in terms of light absorption, photosynthetic efficiency, biomass production and nutrient removal rates, along with community composition. Varying percentage CO2 addition and associated change in culture pH resulted in 3 distinct microalgal communities. Light absorption by the microalgae increased by up to 144% with CO2 addition, while a reduction in the package effect meant that there was less internal self-shading thereby increasing the efficiency of light absorption. Carbon augmentation increased the maximum rate of photosynthesis by up to 172%, which led to increased microalgal biovolume by up to 181% and an increase in total organic biomass for all treatments except 10% CO2. While 10% CO2 improved light absorption and photosynthesis this did not translate to enhanced microalgal productivity. Increased microalgal productivity with CO2 addition did not result in increased dissolved nutrient (nitrogen and phosphorus) removal. This experiment demonstrated that winter-time carbon augmentation up to 5% CO2 improved microalgal light absorption and utilisation, which ultimately increased microalgal biomass and is likely to enhance total annual microalgal areal productivity in HRAPs.

Graphical abstract



Referente a BioProcesos-Cultivo-Biorreactor/FBR

Enhancing growth rate and lipid yield of Chlorella with nuclear irradiation under high salt and CO2 stress

Fecha de Publicación: Marzo 2016
Fuente: Bioresource Technology, Volume 203
Autor(es): Jun Cheng, Hongxiang Lu, Yun Huang, Ke Li, Rui Huang, Junhu Zhou, Kefa Cen
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0960852415016624%26_version%3D1%26md5%3D92b8329df28b75ba4800ac677e33f4fa

Abstract

In order to produce biodiesel from microalgae cultured with abundant seawater, Chlorella sp. was mutated with ^{137}Se-γ ray irradiation and domesticated with f/2 seawater culture medium (salinity=3wt.%) under 15vol.% CO2 stress. Biomass yield of the mutant increased by 25% compared with wild species and lipid content increased to 54.9%. When nitrogen and phosphorus concentrations in the initial substrate increased, the increased propagation speed of the mutant resulted in decreased cell diameter by 26.6% and decreased cell wall thickness by 69.7%. The dramatically increased biomass yield of the mutant with sufficient initial substrate and relative nitrogen starvation in the later growth period with continuous 15vol.% CO2 led to an increased lipid yield of 1.0g/L. The long-chain unsaturated fatty acids increased, whereas short-chain saturated fatty acids decreased.

Referente a BioProcesos-Cultivo-Heterotrófico

Age affects not only metabolome but also metal toxicity in Scenedesmus quadricauda cultures

Fecha de Publicación: 5 Abril 2016
Fuente: Journal of Hazardous Materials, Volume 306
Autor(es): Jozef Kováčik, Bořivoj Klejdus, Petr Babula, Josef Hedbavny
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0304389415302570%26_version%3D1%26md5%3D0e8afbf92e1ff86ea49a81e95256f918

Abstract

Responses of Scenedesmus quadricauda grown in vitro and differing in age (old culture—13 months, young culture—1 month) to short-term cadmium (Cd) or nickel (Ni) excess (24h) were compared. Higher age of the culture led to lower amount of chlorophylls, ascorbic acid and glutathione but higher signal of ROS. Surprisingly, sucrose was detected using DART-Orbitrap MS in both old and young culture and subsequent quantification confirmed its higher amount (ca. 3-times) in the old culture. Cd affected viability and ROS amount more negatively than Ni that could arise from excessive Cd uptake which was also higher in all treatments than in respective Ni counterparts. Surprisingly, nitric oxide was not extensively different in response to age or metals. Strong induction of phytochelatin 2 is certainly Cd-specific response while Ni also elevated ascorbate content. Krebs cycle acids were more accumulated in the young culture but they were rather elevated in the old culture (citric acid under Ni excess). We conclude that organic solid 'Milieu Bristol' medium we tested is suitable for long-term storage of unicellular green algae (also successfully tested for Coccomyxa sp. and Parachlorella sp.) and the impact of age on metal uptake may be useful for bioremediation purposes.

Profiling of lipid and glycogen accumulations under different growth conditions in the sulfothermophilic red alga Galdieria sulphuraria

Fecha de Publicación: Enero 2016
Fuente: Bioresource Technology, Volume 200
Autor(es): Toshihiro Sakurai, Motohide Aoki, Xiaohui Ju, Tatsuya Ueda, Yasunori Nakamura, Shoko Fujiwara, Tomonari Umemura, Mikio Tsuzuki, Ayumi Minoda
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0960852415015394%26_version%3D1%26md5%3Da9f090c5eb76d41b2999dddc1aa5fe1c

Abstract

The unicellular red alga Galdieria sulphuraria grows efficiently and produces a large amount of biomass in acidic conditions at high temperatures. It has great potential to produce biofuels and other beneficial compounds without becoming contaminated with other organisms. In G. sulphuraria, biomass measurements and glycogen and lipid analyses demonstrated that the amounts and compositions of glycogen and lipids differed when cells were grown under autotrophic, mixotrophic, and heterotrophic conditions. Maximum biomass production was obtained in the mixotrophic culture. High amounts of glycogen were obtained in the mixotrophic cultures, while the amounts of neutral lipids were similar between mixotrophic and heterotrophic cultures. The amounts of neutral lipids were highest in red algae, including thermophiles. Glycogen structure and fatty acids compositions largely depended on the growth conditions.

Applicability of Euglena gracilis for biorefineries demonstrated by the production of α-tocopherol and paramylon followed by anaerobic digestion

Fecha de Publicación: 10 Diciembre 2015
Fuente: Journal of Biotechnology, Volume 215
Autor(es): Philipp Grimm, Joe M. Risse, Dominik Cholewa, Jakob M. Müller, Usama Beshay, Karl Friehs, Erwin Flaschel
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0168165615001698%26_version%3D1%26md5%3D4922cde6608c001775c00d5a77ddd0bf

Abstract

In this study the use of Euglena gracilis biomass for α-tocopherol, paramylon and biogas production in a value-added chain was investigated. Therefore, we analyzed the dry cell weight and product concentrations at different growth phases during heterotrophic, photoheterotrophic and photoautotrophic cultivation in a low-cost minimal medium. Furthermore, the specific biogas yields for differently derived biomass with and without product recovery were investigated. We demonstrate that growth phase and cultivation mode not only have a significant impact on product formation, but also influence the yield of biogas obtained from anaerobic digestion of Euglena gracilis biomass. The maximum dry cell weight concentration ranged from 12.3±0.14gL^{-1} for heterotrophically to 3.4±0.02gL^{-1} for photoautotrophically grown Euglena gracilis cells. The heterotrophically grown biomass accumulated product concentrations of 5.3±0.12mgL^{-1} of α-tocopherol and 9.3±0.1gL^{-1} of paramylon or 805±10.9mL of biogasgvs^{-1} (per gram volatile solids).

The results for photoautotrophically grown cells were 8.6±0.22mgL^{-1} of α-tocopherol and 0.78±0.01gL^{-1} of paramylon or 648±7.2mL of biogasgvs $^{-1}$. For an energy-saving downstream procedure the extracting agent methanol does not have to be removed strictly. Samples with residual methanol showed a significantly increased biogas yield, because the solvent can be used as an additional substrate for methane production by archaebacteria.

Referente a BioProcesos-Cosecha-Centrifugado

Metabolomic analysis of the green microalga Chlamydomonas reinhardtii cultivated under day/night conditions

Fecha de Publicación: 10 Diciembre 2015
Fuente: Journal of Biotechnology, Volume 215
Autor(es): Rémi Willamme, Zouheir Alsafra, Rameshkumar Arumugam, Gauthier Eppe, Françoise Remacle, R.D. Levine, Claire Remacle
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0168165615001893%26_version%3D1%26md5%3Da2d8f381a5baac0bb93b7c231609a80d

Abstract

Biomass composition of Chlamydomonas reinhardtii was studied during two consecutive cycles of 12h light/12h dark. As in our experimental conditions the two synchronized divisions were separated by 20h, it was possible to show that accumulation of dry weight, proteins, chlorophyll and fatty acids mainly depends on cell division, whereas starch accumulation depends on a circadian rhythm as reported previously. Our metabolomics analyses also revealed that accumulation of five (Ser, Val, Leu, Ile and Thr) of the nine free amino acids detected displayed rhythmicity, depending on cell division while Glu was 20–50 times more abundant than the other ones probably because this free amino acid serves not only for protein synthesis but also for biosynthesis of nitrogen compounds. In addition, we performed a thermodynamic-motivated theoretical approach known as 'surprisal analysis'. The results from this analysis showed that cells were close to a steady state all along the 48h of the experiment. In addition, calculation of free energy of cellular metabolites showed that the transition point, i.e. the state which immediately precedes cell division, corresponds to the most unstable stage of the cell cycle and that division is identified as the greatest drop in the free energy of metabolites.

Referente a BioProcesos-Cosecha-Floculación

Harvesting microalgae by flocculation–sedimentation

Fecha de Publicación: Enero 2016
Fuente: Algal Research, Volume 13
Autor(es): Tawan Chatsungnoen, Yusuf Chisti
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS2211926415301223%26_version%3D1%26md5%3Ddfb058742c9444570d91392afcc08498

Abstract

Slurries of five marine and freshwater microalgae (Chlorella vulgaris, Choricystis minor, Cylindrotheca fusiformis, Neochloris sp., Nannochloropsis salina) were effectively flocculated using aluminum sulfate and ferric chloride as flocculants. The flocculant dose for 95% removal of the algal biomass by sedimentation in a standardized 62min treatment depended on the following factors: the type of the flocculant; the algal species and cell diameter; the concentration of the biomass in the algal slurry; and the ionic strength of the suspending fluid. For all algae, the flocculant dose for 95% removal of the cells increased linearly with the concentration of the biomass in the slurry. Aluminum sulfate was a generally better flocculant than ferric chloride. Less flocculant was required for flocculation from a high ionic strength medium for the one alga (C. vulgaris) that could be grown both in freshwater- and seawater-based media. Quantitative relationships are reported for the flocculant dose dependence on the biomass concentration in suspensions of the five algae.

Algal biofilm reactors for integrated wastewater treatment and biofuel production: A review

Fecha de Publicación: 1 Marzo 2016
Fuente: Chemical Engineering Journal, Volume 287
Autor(es): Donghee Hoh, Stuart Watson, Eunsung Kan
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS138589471501606X%26_version%3D1%26md5%3D3ca5a5a7808a62b7a5d5619ed6486248

Abstract

This review analyzes various algal biofilm reactors used for integrated wastewater treatment and biofuel production to overcome the current challenges for algal biofuel production. Various reactor configurations, support materials and operation strategies of algal biofilm reactors are discussed and compared with conventional suspended culture systems in terms of algal biomass productivity, nutrient removal, biomass harvest and biofuel production. The rotating biofilm reactor among various types of biofilm reactors was found to be a promising option to provide high biomass productivity and efficient utilization of nutrients in wastewater. Some materials such as stainless steel, nylon and natural fibers among various materials were found to be highly effective for supporting microalgal biofilm. To date mainly municipal wastewater has been integrated with algal bioreactors while only a few agricultural wastewater have been used for algal bioreactors due to inhibition of algal growth with high ammonium concentrations in animal manure and poor light delivery with high turbidity of animal manure. Overall, the algal biofilm reactors integrated with wastewater would have great potential for high productivity of algal biomass and efficient wastewater treatment if various conditions are optimized.

Sedimentation-induced detachment of magnetite nanoparticles from microalgal flocs

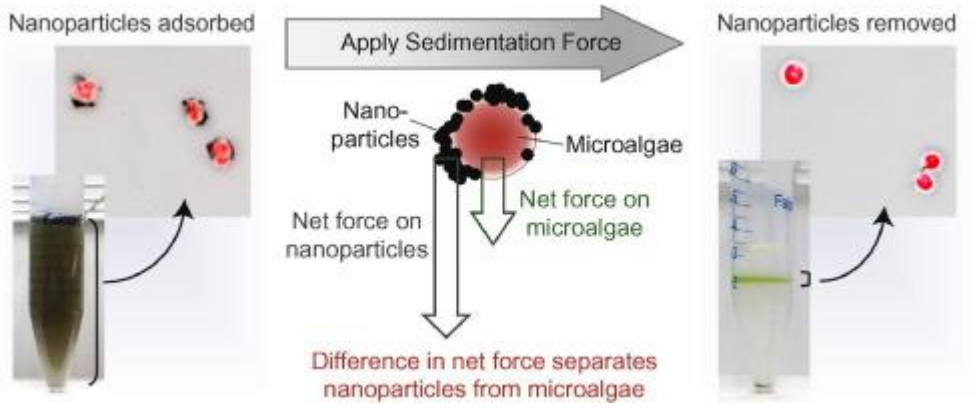
Fecha de Publicación: Enero 2016
Fuente: Bioresource Technology, Volume 200
Autor(es): Shofu Matsuda, Andrew R. Durney, Lijie He, Hitomi Mukaibo
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS096085241501531X%26_version%3D1%26md5%3D91580f5a05c79185d3a4bf6b0d9b13b0

Abstract

The objective of this study is to develop a simple, one-step approach to separate adsorbed Fe3O4 nanoparticles from microalgal flocs for further downstream processing. Using the wild-type strain of fresh-water algae Chlamydomonas reinhardtii, effective removal of nanoparticles from microalgal flocs by both centrifugal sedimentation (at 1500 or 2000g) and magnetic sedimentation (at 1500 Oe) is demonstrated. At the physiological pH of the solution (i.e., pH 7.0), where the electrostatic force between the nanoparticles and the microalgal cells is strongly attractive, larger separation force was achieved by simply increasing the density and viscosity of the solution to 1.065g/mL and 1.244cP, respectively. The method described here offers significant opportunity for purifying microalgal biomass after nanoparticle-flocculation-based harvesting and decreasing the

cost of microalgal biotechnology. This may also find avenues in other applications that apply flocculation, such as algal biofilm formation in photobioreactors and wastewater treatment.

Graphical abstract



Referente a BioProcesos-Cosecha-Flotación

Hydrothermal liquefaction of freshwater and marine algal biomass: A novel approach to produce distillate fuel fractions through blending and co-processing of biocrude with petrocrude

Fecha de Publicación: Disponible online 18 Diciembre 2015
Fuente: Bioresource Technology
Autor(es): Melcure Raj Lavanya, Arunachalam Meenakshisundaram, Sahadevan Renganathan, Senthil Chinnasamy, David Milton Lewis, Jaganathan Nallasivam, Sailendra Bhaskar
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0960852415016430%26_version%3D1%26md5%3D5b2eddd2999292b6c8f4c84831e65c2b

Abstract

Biocrude was produced from Tetraselmis sp. - a marine alga and Arthrospira platensis - a fresh water alga using hydrothermal liquefaction (HTL) process. Considering the constraints in cultivating algae for replacing 100% petrocrude, this study evaluated the option of blending and co-processing algal biocrude with petrocrude. Biocrudes obtained from algal strains cultivated in fresh water and sea water were blended with petrocrude at 10% concentration and the characteristics were studied using FT-IR and CNS SIMDIST. True Boiling Point (TBP) distillation was

carried out to assess the distillate yields and properties of blended biocrudes. Biocrudes obtained from both algae were light crudes and the blended crudes recorded distillate yields of 76-77 wt%. The yield of light naphtha fraction of biocrude blends was 29-30%; whereas the yield of diesel fraction was about 18%. This study proposes blending and co-processing of algal biocrude with petrocrude to produce drop-in biofuels.

Referente a BioProcesos-Cosecha-Filtración

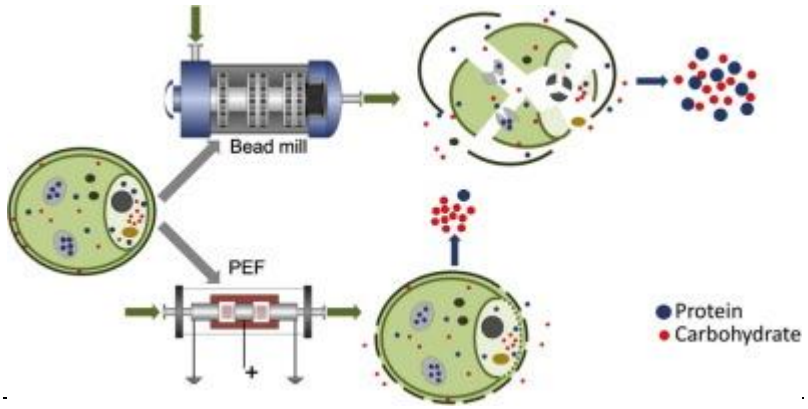
Selective extraction of intracellular components from the microalga Chlorella vulgaris by combined pulsed electric field–temperature treatment

Fecha de Publicación: Marzo 2016
Fuente: Bioresource Technology, Volume 203
Autor(es): P.R. Postma, G. Pataro, M. Capitoli, M.J. Barbosa, R.H. Wijffels, M.H.M. Eppink, G. Olivieri, G. Ferrari
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0960852415016429%26_version%3D1%26md5%3D8065928d755591bb6144111c82a8d594

Abstract

The synergistic effect of temperature (25–65°C) and total specific energy input (0.55–1.11kWhkgDW $^{-1}$) by pulsed electric field (PEF) on the release of intracellular components from the microalgae Chlorella vulgaris was studied. The combination of PEF with temperatures from 25 to 55°C resulted in a conductivity increase of 75% as a result of cell membrane permeabilization. In this range of temperatures, 25–39% carbohydrates and 3–5% proteins release occurred and only for carbohydrate release a synergistic effect was observed at 55°C. Above 55°C spontaneous cell lysis occurred without PEF. Combined PEF–temperature treatment does not sufficiently disintegrate the algal cells to release both carbohydrates and proteins at yields comparable to the benchmark bead milling (40–45% protein, 48–58% carbohydrates).

Graphical abstract



Effects of anodic oxidation of a substoichiometric titanium dioxide reactive electrochemical membrane on algal cell destabilization and lipid extraction

Fecha de Publicación: Marzo 2016
Fuente: Bioresource Technology, Volume 203
Autor(es): Likun Hua, Lun Guo, Megha Thakkar, Dequan Wei, Michael Agbakpe, Liyuan Kuang, Maraha Magpile, Brian P. Chaplin, Yi Tao, Danmeng Shuai, Xihui Zhang, Somenath Mitra, Wen Zhang
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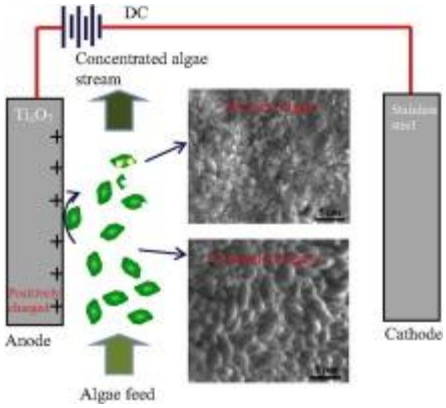
Abstract

Efficient algal harvesting, cell pretreatment and lipid extraction are the major steps challenging the algal biofuel industrialization. To develop sustainable solutions for economically viable algal biofuels, our research aims at devising innovative reactive electrochemical membrane (REM) filtration systems for simultaneous algal harvesting and pretreatment for lipid extraction. The results in this work particularly demonstrated the use of the Ti4O7-based REM in algal pretreatment and the positive impacts on lipid extraction. After REM treatment, algal cells exhibited significant disruption in morphology and photosynthetic activity due to the anodic oxidation. Cell lysis was evidenced by the changes of fluorescent patterns of dissolved organic matter (DOM) in the treated algal suspension. The lipid extraction efficiency increased from 15.2±0.6g-lipidg-algae^{-1} for untreated algae to 23.4±0.7g-lipidg-algae^{-1} for treated algae (p

<0.05), which highlights the potential to couple algal harvesting with cell pretreatment in an integrated REM filtration process.

Graphical abstract



Antifouling PVDF membrane prepared by VIPS for microalgae harvesting

Fecha de Publicación: 13 Marzo 2016
Fuente: Chemical Engineering Science, Volume 142
Autor(es): Antoine Venault, Melibeth Rose B. Ballad, Yu-Tzu Huang, Yi-Hung Liu, Chi-Han Kao, Yung Chang
Enlace:
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Abstract

Provided the use of a water-insoluble modifier, in-situ modification of PVDF membranes is an ideal method for preparing low-biofouling membranes. We report the formation, characterization and low-biofouling performances of modified PVDF membranes prepared by vapor-induced phase separation for microalgae harvesting. Poly(styrene)-b-poly(ethylene glycol) methacrylate (PS-b-PEGMA) is used as antifouling material. After characterizing the physico-chemical properties of membranes by SEM, AFM, FT-IR, XPS, and tensile tester, their hydrophilicity was assessed. Hydration capability was importantly enhanced with copolymer content. Adsorption of bovine serum albumin (BSA), lysozyme (LY) and fibrinogen (FN) was tested to investigate the resistance of membranes to nano-biofouling. Best results were obtained with membrane prepared from a

casting solution containing 4wt% copolymer (PS-b-PEGMA-4). Bacterial attachment tests proved that membranes could also resist micro-biofouling. Flux recovery ratio after filtration of BSA with PS-b-PEGMA-4 membrane was higher than with a commercial hydrophilic PVDF membrane. Applied in microalgae harvesting, it was found that membranes could efficiently resist biofouling by microalgae (FRR=76.9% with PS-b-PEGMA-4), still enabling a rejection ratio over 99.7%.

Membrane fouling in osmotically driven membrane processes: A review

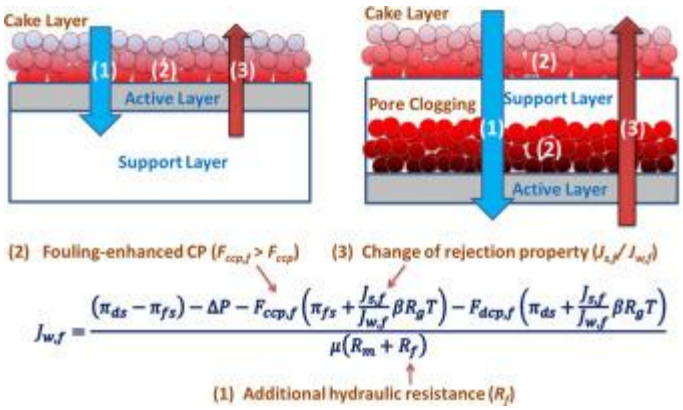
Fecha de Publicación: 1 Febrero 2016
Fuente: Journal of Membrane Science, Volume 499
Autor(es): Qianhong She, Rong Wang, Anthony G. Fane, Chuyang Y. Tang
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0376738815302702%26_version%3D1%26md5%3D27055d07aa1afbc02e75cf217599a928

Abstract

The utilization of osmosis for engineered applications sparked off various emerging technologies relying on osmotically driven membrane processes (ODMPs). Represented by forward osmosis (FO) and pressure retarded osmosis (PRO), ODMPs show great promise to leverage the global water-energy nexus and have drawn considerable attention in recent years. However, their performance in practical applications is significantly affected by membrane fouling. Membrane fouling is a complex problem and is associated with the foulant deposition, concentration polarization and reverse solute diffusion (RSD) in ODMPs. The current paper provides a comprehensive review on membrane fouling in ODMPs with a focus on the elaboration of the factors and mechanisms governing the fouling behavior. Among those fouling factors and mechanisms, some are also applicable for pressure-driven membrane processes (e.g., reverse osmosis (RO) and nanofiltration (NF)), such as the effects of hydrodynamic conditions, feedwater composition, and membrane material and properties, and the cake-enhanced concentration polarization (CE-CP) mechanism. Others are unique for ODMPs, such as the effects of draw solution composition and membrane orientation, the internal concentration polarization (ICP) self-compensation effect, and the RSD-enhanced fouling. A general osmotic-resistance filtration model for ODMPs is presented in this paper to assist in the interpretation of the intrinsic interrelationships among those fouling factors and mechanisms. The impact and mechanisms of membrane fouling on contaminates removal are also reviewed briefly based on the limited existing literature on this topic. Finally, the available membrane fouling control strategies for ODMPs are summarized upon understanding the cause and effect of fouling. Based on the current

review, future research prospects are proposed for further studying the membrane fouling in ODMPs.

Graphical abstract



Referente a BioProcesos-Secado

Enhanced methane production from algal digestion using free nitrous acid pre-treatment

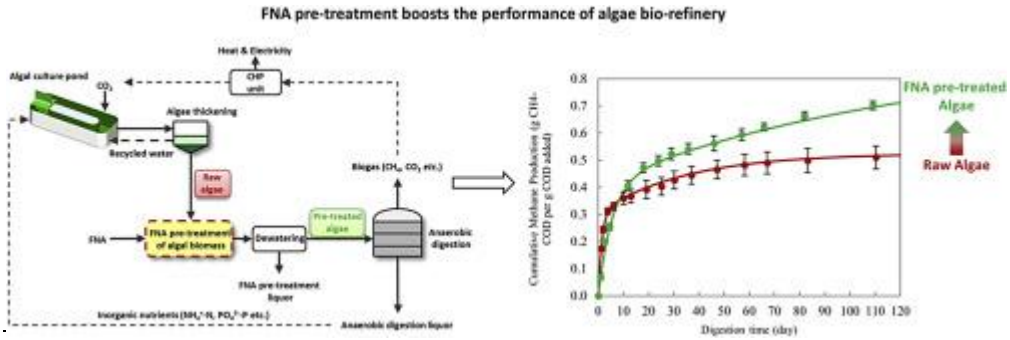
Fecha de Publicación: Abril 2016
Fuente: Renewable Energy, Volume 88
Autor(es): Xue Bai, Paul A. Lant, Paul D. Jensen, Sergi Astals, Steven Pratt
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0960148115304602%26_version%3D1%26md5%3D06913d04b26dd9b10dfad6f608d86b1a

Abstract

The methane yield from the digestion of algae is typically much lower than the theoretical methane yield, and lower than yields reported for other organic substrates. This study presents a novel free nitrous acid (FNA) pre-treatment technique to improve methane production from algal biomass. The methane production yield through anaerobic digestion was found to be dramatically enhanced by FNA pre-treatment (2.31 mg HNO2–N L^{-1}), with a 51% increase in the methane yield (from 161 to 250 L CH4 per kg VS added). A two substrate model was used to describe the apparent presence of rapid and slowly degradable material. Model-based analysis revealed that with FNA pre-treatment (2.31 mg HNO2–N L^{-1}), the availability of both rapid and slowly

biodegradable substrates were increased. Higher levels of nitrite (159 and 1006 mg N L^{-1}) had an inhibitory/toxic effect. For this reason, coupled with the fact that denitrification of nitrite consumes organic substrate, it is concluded that pre-treatment liquor should be removed before digestion.

Graphical abstract



A comparative study on the catalytic effect of H-ZSM5 on upgrading of pyrolysis vapors derived from lignocellulosic and proteinaceous biomass

Fecha de Publicación: 15 Febrero 2016
Fuente: Fuel, Volume 166
Autor(es): Chiara Lorenzetti, Roberto Conti, Daniele Fabbri, Jale Yanik
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS001623611501056X%26_version%3D1%26md5%3D8c86fb680ea88cd93b023bf43ed05c30

Abstract

The upgrading of biomass pyrolysis vapors by zeolite cracking over H-ZSM5 (Si/Al 45, biomass:zeolite mass ratio 1:10) was investigated by analytical (Py–GC–MS) and preparative pyrolysis. Pine sawdust, the microalgae Spirulina platensis, seaweed (Ulva sp.), and marine fish discard were selected as representative biomass with different composition, in particular protein content (from <1% to 55%d.w.). Py–GC–MS showed that the relative product distribution from zeolite cracking was dominated by alkylated benzenes, with minor levels of benzene and polycyclic aromatic hydrocarbons (PAHs) for all the samples, while the levels of nitrogen-containing compounds (N-CCs) increased with increasing biomass protein content. Preparative pyrolysis was

conducted with a semi-batch system by treating the biomass at 460°C. The evolved vapors were subjected to zeolite cracking at 460°C, the yields of pyrolysis fractions (char, bio-oil, aqueous phase, volatiles, coke and gas) were quantified and compared with those determined in the absence of catalytic treatment (thermal pyrolysis). Due to the reactor configuration the yields of char formed from thermal and catalytic pyrolysis were similar, while the yield of bio-oil decreased considerably after zeolite cracking with a concomitant formation of coke (6–14%), water and volatiles, which was higher for the proteinaceous biomass. However, the bio-oils from catalytic pyrolysis were characterized by lower levels of nitrogen and oxygen, a higher carbon content and a GC–MS composition dominated by monoaromatic hydrocarbons (>60%), followed by PAHs (mostly naphthalene). The relative abundance of N-CCs in catalytic bio-oil was lower in comparison to Py–GC–MS suggesting that a fraction was distributed into the aqueous phase. In general, HZSM-5 exhibited a significant dehydration, deoxygenation and denitrogenation effect favoring the formation of a “gasoline-like” bio-oil even from a highly proteinaceous biomass. However, it also induced the formation of nitrogen-containing polyaromatic compounds, like carbazoles.

Referente a BioProcesos-Extracción-Soxhlet

Prospects of 2nd generation biodiesel as a sustainable fuel—Part: 1 selection of feedstocks, oil extraction techniques and conversion technologies

Fecha de Publicación: Marzo 2016
Fuente: Renewable and Sustainable Energy Reviews, Volume 55
Autor(es): M.M.K. Bhuiya, M.G. Rasul, M.M.K. Khan, N. Ashwath, A.K. Azad
Enlace:
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Abstract

The transport sector, which heavily depends on oil-derived liquid products such as gasoline and diesel, globally occupies the 3rd place when total energy consumption and greenhouse gas (GHG) emissions are considered (after the industry and the building sectors). This consumption level is predicted to increase by 60% by 2030 mainly because of population growth, industrialization and exposure to better living standards. Biodiesel is one of the sustainable sources of energy for meeting increasing global transport energy demand and reducing GHG emissions significantly. The

use of non-edible plant oils is very significant because it can be grown in harsh and marginal lands which require less maintenance, less soil fertility and less water as opposed to arable lands for growing edible vegetable oils. However, it is noted that the 2nd generation feedstocks can also be grown in arable lands, but this is not a general practice and is not recommended. The 2nd generation biodiesel can be considered as a promising alternative because of its feedstocks, such as non-edible vegetable oils, animal fats and waste cooking oils are cheaper in most of the countries in the world than the 1st generation feedstocks which are produced from edible-vegetable oils (food crops). Furthermore, the price of biodiesel depends on the cost of feedstocks which makes up 70–95% of the total production costs. However, extraction of non-edible oils as well as conversion process of oil into biodiesel should be well scrutinized. This paper extensively reviews on the selection of 2nd generation biodiesel feedstocks, oil extraction as well as biodiesel conversion techniques with the aim to identify the most appropriate and cost-effective feedstocks, identify the most suitable oil extraction technique and most efficient technology for producing of the 2nd generation biodiesel which will substitute the current dependence on the fossil fuel worldwide. This paper will contribute to greater understanding of the recent development and prospects of 2nd generation biodiesel as a sustainable transport fuel.

Evaluation of thermochemical properties of raw and extracted microalgae

Fecha de Publicación: 1 Deciembre 2015
Fuente: Energy, Volume 92, Part 3
Autor(es): A.F. Ferreira, A.P. Soares Dias, C.M. Silva, M. Costa
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0360544215005332%26_version%3D1%26md5%3Db6b5cebf6b3df7506951a388660de065

Abstract

The thermochemical behavior of three raw and respective solvent extracted (ultrasound assisted) microalgae species – CV (Chlorella vulgaris), SC (Scenedesmus obliquus) and NOc (Nannochloropsis oculata) – was studied in order to evaluate their potential as fuels. Thermograms were obtained for four heating rates (5–25 °C/min). The results reveals that (i) for all microalgae thermal degradation processes of carbohydrates, lipids and proteins were observed for temperatures below 450 °C, while the char oxidation occurred for temperatures between 450 and 600 °C; (ii) the raw CV and SC required less energy to initiate the oxidation process than the raw NOc due to the higher amounts of lipids present in the latter microalgae; (iii) the extracted SC and NOc showed a behavior significantly different than the raw SC and NOc in the stages related to the lipids and

proteins decomposition; (iv) the FTIR (Fourier transform infrared spectroscopy) spectra obtained for the raw and extracted microalgae showed significant differences in their oil and polysaccharides contents, revealing that ultrasound extraction using a mixture of n-hexane-isopropanol as solvent is adequate to extract these components from the microalgae studied; and (v) the calculated activation energy values are generally similar for the raw and extracted microalgae.

Lipid content and fatty acid profile of Nannochloropsis oculata before and after extraction with conventional solvents and/or compressed fluids

Fecha de Publicación: Disponible online 10 Noviembre 2015
Fuente: The Journal of Supercritical Fluids
Autor(es): Francis J.L. Baumgardt, Arion Zandoná Filho, Marcus V. Brandalize, Dayane C. da Costa, Nelson R. Antoniosi Filho, Paulo C.O.V. Abreu, Marcos L. Corazza, Luiz Pereira Ramos
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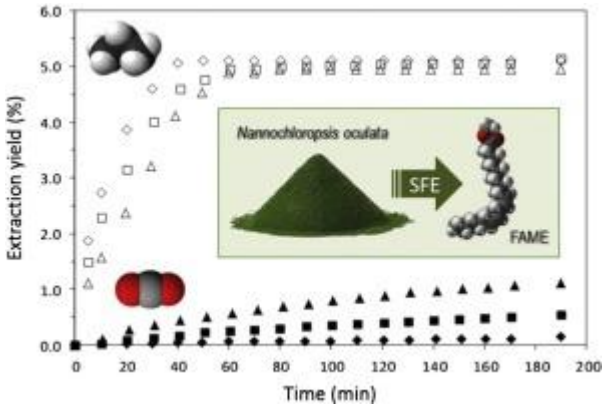
Abstract

The lipid content and fatty acid profile of freshly harvested Nannochloropsis oculata was characterized before and after extraction with both conventional solvents and compressed fluids. Among the conventional solvents, ethanol was the most efficient, yielding 11.33g of fatty acids methyl esters per $100g^{-1}$ of dry microalga biomass. The addition of ethanol as co-solvent at a mass ratio of 1:1 improved the extraction performance of both subcritical propane and supercritical CO2. At 200bar and 80°C, the extraction of N. oculata with propane in the presence of ethanol resulted in the best yield of 7.53g of fatty acid methyl esters per 100g of the desalted biomass. By replacing propane by carbon dioxide, this yield dropped 45.8%. However, under the conditions used in this study, both conventional and compressed fluid extractions did not remove the entirety of the microalga fatty acids, demonstrating that these processes toned to be optimized to avoid mass transfer limitations. Even so, the use compressed fluids reduced the amount of solvent used when compared to extraction with a conventional Soxhlet apparatus.

Graphical abstract



Referente a BioProcesos-Extracción-Supercrítica

Study of the diffusion coefficient of solute-type extracts in supercritical carbon dioxide: Volatile oils, fatty acids and fixed oils

Fecha de Publicación: Marzo 2016
Fuente: The Journal of Supercritical Fluids, Volume 109
Autor(es): Alexis López-Padilla, Alejandro Ruiz-Rodriguez, Guillermo Reglero, Tiziana Fornari
Enlace:
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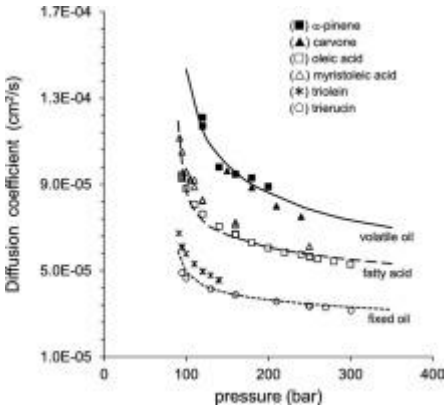
Abstract

Supercritical carbon dioxide (SCCO2) extraction is an innovative and efficient method to recover valued substances from vegetal materials. The diffusion behavior of the extract in the supercritical solvent is an important parameter to understand the mass transfer behavior of the process. In this work, experimental data from the literature were utilized to analyze the diffusivity of lipophilic chemically similar solutes in SCCO2. Substances with similar chemical structure, molecular weight and volatility, have also very similar diffusion coefficients, which are mainly determined by temperature, pressure and, in turn, by the corresponding physicochemical properties of the supercritical solvent (density and viscosity). Based on this premise, general correlations were derived to represent the diffusion coefficient of volatile oils, fatty acids and its esters, and fixed oils (triglycerides) in SCCO2 as a function solely of pressure and temperature. The diffusion coefficients obtained were satisfactory compared with those calculated with theoretical and semi-empirical models from the literature, which require pure component parameters.

Graphical abstract



Supercritical Fluids and Polymers–The Year in Review–2014

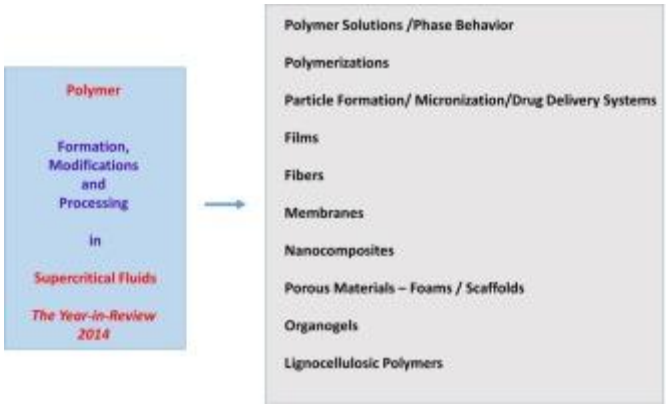
Fecha de Publicación: Disponible online 1 Diciembre 2015
Fuente: The Journal of Supercritical Fluids
Autor(es): Erdogan Kiran
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0896844615301844%26_version%3D1%26md5%3D0e0bd2948435e13354acc4b4cf711dd7

Abstract

A critical overview of publications on applications of supercritical fluids in polymer formation, modification and processing is presented. The review is focused on publications that appeared in 2104 only with the intent of providing an in-depth look at the activity in the most recent year to gain insights on the more recent trends and opportunities. The articles have been grouped under 9 different application areas which include (1) polymer solutions and phase behavior, (2) polymerizations, (3) particle formation/micronization/drug delivery systems, (4) films, (5) fibers, (6) membranes, (7) nanocomposites, (8) porous materials-foams/scaffolds, (9) organogels, and (10) lignocellulosic polymers. In each category, articles are discussed under specific polymer or polymer type to better highlight those polymers that are receiving the greater level of attention. In 2014, more polymers were explored for their foamability, and for generation of nanocomposites. Poly(ε-caprolactone), poly(lactic acid) and poly (lactide-co-glycolide) were the most frequently investigated polymers for their porous matrix formation, or particle formation features using supercritical carbon dioxide because of their biomedical significance as biodegradable platforms

for tissue engineering scaffolds and drug delivery devices. Poly(ethylene oxide), poly(lactic acid), and poly(methyl methacrylate) were the polymers that were explored in multiple application areas. Based on the close examination of these publications, the review provides specific observations on the advances that are made towards improved understanding of the factors that affect the miscibility of polymers in carbon dioxide, and for further understating of the synergistic or other effects of components in polymer blends and composites, including the consequences of the presence of crystalline versus amorphous domains and morphological differences, or the consequences of the presence of nanofillers in different applications. New perspectives that are emerging in each application area are presented.

Graphical abstract



Catalytic upgrading of pretreated algal bio-oil over zeolite catalysts in supercritical water

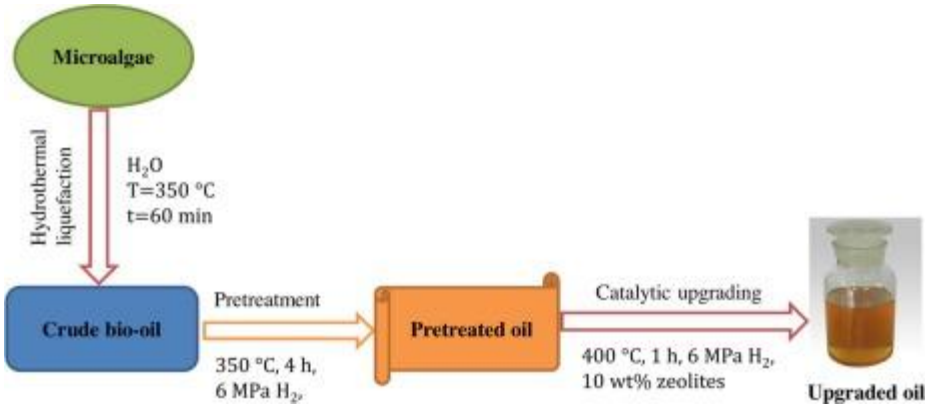
Fecha de Publicación: Disponible online 8 Diciembre 2015
Fuente: Biochemical Engineering Journal
Autor(es): Peigao Duan, Yuping Xu, Feng Wang, Bing Wang, Weihong Yan
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS1369703X15301224%26_version%3D1%26md5%3D199fb52ebe100c237bba6a685c216356

Abstract

We report the catalytic hydrothermal upgrading of pretreated algal bio-oil. The reaction was performed at 400°C for 240min with the addition of 6MPa H2 and 10wt.% zeolite catalyst in

supercritical water (ρH2O =0.025g/cm^3). Nine zeolites (Hβ, HZSM-5 (SiO2/Al2O3 =25:1), HZSM-5 (SiO2/Al2O3 =50:1), HZSM-5 (SiO2/Al2O3 =170:1), HY (5% Na2O), HY (0.8% Na2O), SAPO-11, MCM-41 (50% Si), and MCM-41 (100% Si)) were screened to investigate their effects on the yields of the product fraction and the properties (e.g., elemental composition and heating value) of the upgraded bio-oil. The catalyst type affected the yields of the product fractions: SAPO-11 produced the lowest upgraded bio-oil yield of 42.4wt.%, and MCM-41 provided the highest yield of 54.5wt.%. Compared with non-catalytic upgrading reactions, all of the zeolites promoted the denitrogenation, deoxygenation, and desulfurization of the pretreated bio-oil due to the presence of acid sites. HY (5% Na2O), HY (0.8% Na2O), and HZSM-5 (SiO2/Al2O3 =25:1) showed the highest activity toward denitrogenation, deoxygenation, and desulfurization, respectively. The upgraded bio-oil mainly consisted of hydrocarbons, accounting for 80% in total and as high as 95.6% of the fraction below 400°C.

Graphical abstract



The migration and transformation behaviors of heavy metals during the hydrothermal treatment of sewage sludge

Fecha de Publicación: Enero 2016
Fuente: Bioresource Technology, Volume 200
Autor(es): Hua-jun Huang, Xing-zhong Yuan
Enlace:
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Abstract

Various hydrothermal treatment methods, including hydrothermal carbonization, liquefaction and sub/super-critical water gasification, have been applied to the disposal of sewage sludge for producing bio-materials or bio-fuels. It has become a research hotspot whether the heavy metals contained in sewage sludge can be well treated/stabilized after the hydrothermal treatments. This review firstly summarized the methods of assessing heavy metals' contamination level/risk and then discussed the migration and transformation behaviors of heavy metals from the following aspects: the effect of reaction temperature, the effect of additives (catalysts and other biomass), the effect of the type of solvent and the effect of reaction time. This review can provide an important reference for the further study of the migration and transformation behaviors of heavy metals during the hydrothermal treatment of sewage sludge.

Referente a BioProcesos-Extracción-Ultrasonido

Synergism of microwaves and ultrasound for advanced biorefineries

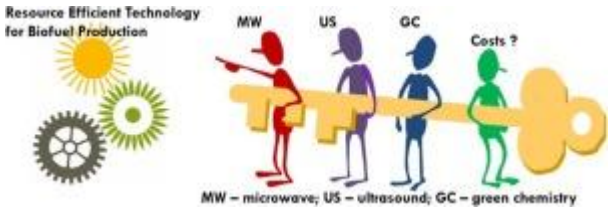
Fecha de Publicación: Diciembre 2015
Fuente: Resource-Efficient Technologies, Volume 1, Issue 2
Autor(es): Veera Gnaneswar Gude
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS2405653715300294%26_version%3D1%26md5%3Dcbc59cea88e8c0f35a0513195950980d

Abstract

Conventional energy sources are limited and non-renewable and their consumption contributes to greenhouse gas emissions. The world is in need of advanced biorefineries to meet ever growing energy demands associated with population growth and economic development. An advanced biorefinery should use renewable and sustainable (both in quality and quantity) feedstock that gives rise to higher energy gains with minimum non-renewable energy and resource consumption. Development of advanced biorefineries is currently encircled by two major issues. The first issue is to ensure adequate biofuel feedstock supplies while the second issue is to develop resource-efficient technologies for the feedstock conversion to maximize energy and economic and environmental benefits. While microalgae, microbial derived oils, and agricultural biomass and other energy crops show great potential for meeting current energy demands in a sustainable manner, process intensification and associated synergism can improve the resource utilization efficiency. Synergism of process intensification tools is important to increase energy efficiency, reduce chemical utilization and associated environmental impacts, and finally process economics.

Among the many process intensification methods, this commentary provides a perspective on the essential role of MWs and US and their synergy in biofuel production. Individual, sequential, and simultaneous applications of MWs and US irradiations can be utilized for process intensification of various biofuels production and selective recovery of high value bioproducts. Process related barriers, namely mass and heat transfer limitations, can be eliminated by this synergism while improving the reaction efficiency and overall process economics significantly. In this article, a brief review focused on recent developments in MW and US mediated process intensification for biofuel synthesis and associated issues in their synergism followed by a discussion on current challenges and future prospective is presented.

Graphical abstract



Ultrasound-assisted extraction of R-phycoerythrin from Grateloupia turuturu with and without enzyme addition

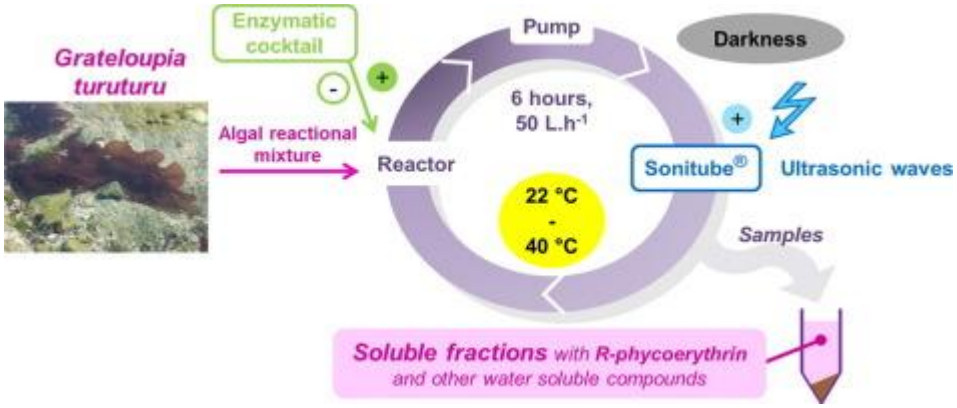
Fecha de Publicación: Noviembre 2015
Fuente: Algal Research, Volume 12
Autor(es): Cécile Le Guillard, Justine Dumay, Claire Donnay-Moreno, Sandrine Bruzac, Jean-Yves Ragon, Joël Fleurence, Jean-Pascal Bergé
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS221192641530093X%26_version%3D1%26md5%3D6cd3fd602e49168f5595a34eba1a9737

Abstract

The aim of this study was to compare two processes for the extraction of R-phycoerythrin (R-PE) from the red seaweed Grateloupia turuturu: ultrasound-assisted extraction (UAE) and ultrasound-assisted enzymatic hydrolysis (UAEH). Process efficiencies were both evaluated by the yield of R-PE extraction and by the level of liquefaction. Experiments were conducted at 40 and 22°C, for 6h, using an enzymatic cocktail and an original ultrasonic flow-through reactor. R-PE appeared very sensitive to temperature, thus 22°C is strongly recommended for its extraction by UAEH or UAE. However, the higher processing temperature (40°C) clearly increased the extraction of water-

soluble compounds (up to 91% of liquefaction). These two new processes are thus promising alternatives for the extraction of water-soluble components including R-PE, from wet seaweeds, with extraction yields at least similar to conventional solid–liquid extraction.

Graphical abstract



Effect of moisture on pretreatment efficiency for anaerobic digestion of lignocellulosic substrates

Fecha de Publicación: Diciembre 2015
Fuente: Waste Management, Volume 46
Autor(es): M. Peces, S. Astals, J. Mata-Alvarez
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0956053X15300908%26_version%3D1%26md5%3D488c27b6b1a7a23f57e8e5c2e69c81f1

Abstract

The present study evaluates the effect of moisture in low-temperature and ultrasound pretreatment on lignocellulosic substrates anaerobic biodegradability, where brewer's spent grain was used as model substrate. Besides moisture content, low-temperature pretreatment was also evaluated in terms of temperature (60–80°C) and exposure time (12–72h). Likewise, ultrasonication was also evaluated in terms of specific energy (1000–50,000kJkgTS^{-1}). In addition, the effect of substrate particle size reduction by milling pretreatment was also considered. The results clearly demonstrated that substrate moisture (total solid concentration) is a significant parameter for pretreatment performance, although it has been rarely considered in pretreatment optimisation. Specifically, moisture optimisation increased the methane yield of brewer's spent

grain by 6% for low-temperature pretreatment (60°C), and by 14% for ultrasound pretreatment (1000kJkgTS^{-1}) towards the control (without pretreatment). In both pretreatments, the experimental optimum total solid concentration was 100gTSkg^{-1}. Thus, lowering substrate moisture, a strategy suggested attaining energetic pretreatment feasibility, needs to be analysed as another pretreatment variable since it might have limited correlation. Finally, a preliminary energetic balance of the pretreatments under study showed that the extra methane production could not cover the energetic pretreatment expenses.

Evaluation of thermochemical properties of raw and extracted microalgae

Fecha de Publicación: 1 Diciembre 2015
Fuente: Energy, Volume 92, Part 3
Autor(es): A.F. Ferreira, A.P. Soares Dias, C.M. Silva, M. Costa
Enlace:
http://rss.sciencedirect.com/action/redirectFile?&zone=main&currentActivity=feed&usageType=outward&url=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%3F_ob%3DGatewayURL%26_origin%3DIRSSSEARCH%26_method%3DcitationSearch%26_piikey%3DS0360544215005332%26_version%3D1%26md5%3Db6b5cebf6b3df7506951a388660de065

Abstract

The thermochemical behavior of three raw and respective solvent extracted (ultrasound assisted) microalgae species – CV (Chlorella vulgaris), SC (Scenedesmus obliquus) and NOc (Nannochloropsis oculata) – was studied in order to evaluate their potential as fuels. Thermograms were obtained for four heating rates (5–25 °C/min). The results reveals that (i) for all microalgae thermal degradation processes of carbohydrates, lipids and proteins were observed for temperatures below 450 °C, while the char oxidation occurred for temperatures between 450 and 600 °C; (ii) the raw CV and SC required less energy to initiate the oxidation process than the raw NOc due to the higher amounts of lipids present in the latter microalgae; (iii) the extracted SC and NOc showed a behavior significantly different than the raw SC and NOc in the stages related to the lipids and proteins decomposition; (iv) the FTIR (Fourier transform infrared spectroscopy) spectra obtained for the raw and extracted microalgae showed significant differences in their oil and polysaccharides contents, revealing that ultrasound extraction using a mixture of n-hexane-isopropanol as solvent is adequate to extract these components from the microalgae studied; and (v) the calculated activation energy values are generally similar for the raw and extracted microalgae.

Patentes

En esta sección del presente boletín se presentan las publicaciones de las ramas del árbol seleccionadas para esta edición.

Las ramas son:
BioProcesos-Cultivo-Piletones
BioProcesos-Cultivo-Biorreactor/FBR
BioProcesos-Cultivo-Heterotrófico
BioProcesos-Cosecha-Floculación
BioProcesos-Cosecha-Flotación
BioProcesos-Cosecha-Filtración
BioProcesos-Secado
BioProcesos-Extracción-Soxhlet
BioProcesos-Extracción-Supercrítica

Referente a BioProcesos-Cultivo-Piletones

Harvesting algae from water

US2015284673A1

Fecha de Publicación: 8 Oct 2015

Aplicación: US201314649524A (25 Nov 2013)

Aplicante: SAPPHIRE ENERGY INC [US]

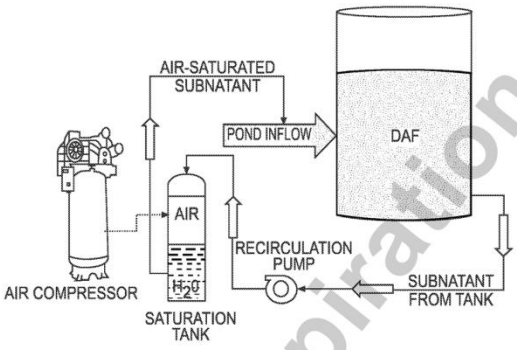


FIG. 1

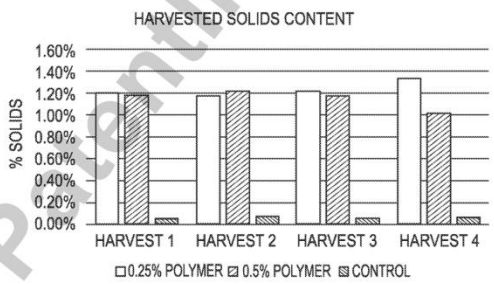


FIG. 2

Abstract:

The present application includes methods to harvest a non-vascular photosynthetic organism (NVPO) such as microalgae from an aqueous culture comprising brackish, non-brackish, marine, sea or saline water using polymer flocculants. The methods are suitable for harvesting NVPO from aqueous culture with total dissovled solids (TDS) of at least 1500 mg/L. Methods are also provided to harvest a NVPO using flocculation with or without a Dissolved Air Flotation (DAF) process. Methods are further provided to flocculate and harvest a NVPO directly in a pond. The present application further provides NVPO-containing intermediates, compositions, or products produced by the methods provided herein.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/US2015284673A1

Large-scale microalgae cultivation method

CN104263649A

Fecha de Publicación: 7 Ene 2015

Aplicación: CN201410468458A (15 Sep 2014)

Aplicante: LI JIAN

Abstract:

The invention discloses a large-scale microalgae cultivation method, and belongs to the technical fields of microalgae cultivation and production. The method comprises the following steps: firstly, carrying out microalgae seed holding and enlarging cultivation in a laboratory, and then carrying out large-scale microalgae species solution cultivation in an outdoor light bioreactor; inoculating microalgae species solutions cultivated by using the light bioreactor into an outdoor runway culture pond, and carrying out large-scale microalgae cultivation in the runway culture pond; and finally obtaining microalgae biomass from the runway culture pond, and producing the microalgae biomass-based product. According to the method, through the combination of the outdoor light bioreactor and the runway culture pond, large-scale microalgae cultivation can be carried out; compared with the microalgae cultivated by a pure runway culture pond or a pure light bioreactor, the production cost is significantly reduced; and a whole set of complete process route is developed.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104263649A

Method for increasing the potential for biofuel production from microalgae by using bio-modulators

WO2014003530A1

Fecha de Publicación: 3 Ene 2014

Aplicación: MA2013000020W (28 Jun 2013)

Aplicante: MOROCCAN FOUNDATION FOR ADVANCED SCIENCE INNOVATION & RES MASCIR [MA]

Abstract:

The present invention proposes a method for cultivating and processing microalgae isolated from marine and extremophilic environments for optimal biofuel production. The species of microalgae selected can be species of the genus Dunaliella (D. bardawil, D. salina, D. acidophilo, D. biolecta, D. lateralis, D. maritima, D. minuta, D. parva, D. peircei, D. polymorpha, D. primolecta, D. pseudosalina, D. quartolecta, D. tertiolecta, D. viridis and others). For the purpose of cultivating microalgae for the production of biofuel, the optimal conditions for the production of biomass and lipids are different. This invention proposes a method which makes it possible to simultaneously stimulate the accumulation of biomass and intracellular lipids (more than 60% by dry weight), essentially the neutral lipids sought for the production of biodiesel, by reinforcing the action of

natural bio-modulators or chemical analogues (auxins, cytoquinines, gibberellins, NaCl) in hypersaline and alkaline conditions. Another aspect of the invention is the application of ad hoc changes to the pH of the cultivation media causing the spontaneous precipitation of cells loaded with lipids once the cycle of growth and storage of lipids intended for the production of biodiesel is complete. This method makes it possible to recover microalgal biomass quickly and passively, requiring little energy and without the step of centrifugation or filtration, in order to extract the intracellular lipids and transform same into biodiesel. This method ensures very selective cultivation conditions which only a predetermined number of species has a similar response to and/or is able to tolerate, which limits the risks of contamination by other microalgae, bacteria or fungi, this frequently being a problem in open cultivation systems such as ponds. This offers a system for cultivating microalgae that is advantageous and applicable on a large scale for the biofuel application and others.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/WO2014003530A1

Method for microcystis algae bloom treatment in earth pond cultivation process

CN102910743A

Fecha de Publicación: 6 Feb 2013

Aplicación: CN201210412182A (25 Oct 2012)

Aplicante: SOUTH CHINA SEA FISHERIES RES

Abstract:

The invention discloses a method for microcystis algae bloom treatment in an earth pond cultivation process. The method includes the steps: 1) when algae bloom happens, closing an automatic aerator, blowing the microcystis algae bloom to downwind positions by the aid of wind force, and using a screen to fish microcystis algae bloom frond floating on the water surface; 2) mixing bacillus inoculant with brown sugar by adding water, soaking the bacillus inoculant and the brown sugar into water for one night, then splashing the mixture into the whole pond for once a day and continuing for 2-3days; and 3) adding inoculant of photosynthetic bacteria into the mixture, splashing the mixture into the whole pond for once a day and continuing for 2-3days. Probiotics are used for absorbing and converting eutrophic substances in water and competing nutrients with microalgae so as to inhibit reproduction of microcystis algae; and bacteria in waters lyse the microcystis algae and decompose and convert microcystin timely, so that cultivation water quality stability is maintained, shrimp diseases can be effectively prevented, survival rate and yield of culture species are increased, and economic benefit is increased.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN102910743A

Referente a BioProcesos-Cultivo-Biorreactor/FBR

Novel photobioreactor for enclosed horizontal cultivation of microalgae

US2015275161A1

Fecha de Publicación: 1 Oct 2015

Aplicación: US201314436891A (22 Oct 2013)

Aplicante:

GRESSELS JONATHAN [US]
GRANOT MORDECHAI [US]

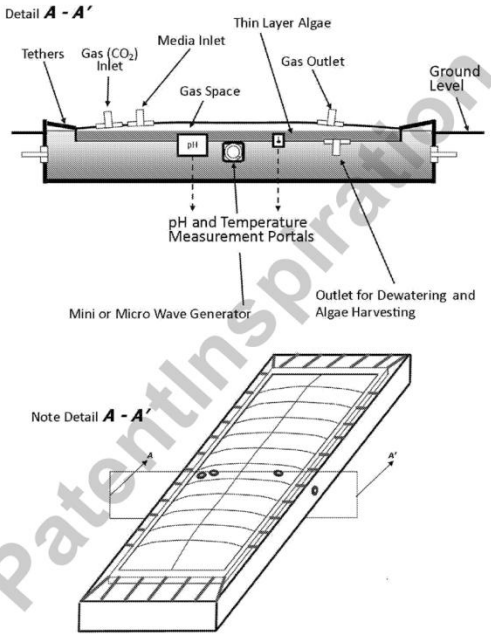


Figure 1

Abstract:

A photobioreactor comprising a sealed, covered plastic sheeting coated with a thin layer of a highly dense culture of photoautotrophic single celled organism. Carbon dioxide is exchanged from a gas space above the culture through attendant mixing by subtending wave motion. The photobioreactor provides a substantial improvement in processing costs in growth media

sterilization as well as reduced expenses related to energy and raw materials, especially carbon dioxide. Capital expenses are reduced by eliminating the need for sparging and compressors for suspending cells and mixing carbon dioxide.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/US2015275161A1

Sunlight indoor guidance system for microalgae cultivation

CN104776394A

Fecha de Publicación: 15 Jul 2015

Aplicación: CN201510155336A (3 Apr 2015)

Aplicante: HANGZHOU XINWEI LOW CARBON TECHNOLOGY R & D CO LTD

Abstract:

The invention relates to a sunlight indoor guidance system for microalgae cultivation. The sunlight indoor guidance system for microalgae cultivation is mainly formed by a sunlight collecting device, a high-energy light spot conducting device, a light filtering device, a light diffusing device and a photobioreactor, wherein the sunlight collecting device is formed by combining a solar tracker and a condenser; the high-energy light spot conducting device is used for conducting high-density energy light spots collected and condensed through the condenser, and transmitting the high-density high-energy light spots to the light filtering device; the light filtering device is placed on the upper end or the lower end of the high-energy light spot conducting device, and is mainly formed by assorted color filters for filtering wavelength light bad for microalgae cultivation or microalgae synthesis beneficial substances; the light diffusing device is mainly used for converting the received high-density energy light spots into light energy with normal density, and is mainly formed by a light diffuser; the light diffuser adopts a scatterer or an optical fiber tail end melter, and directly introduces infrared light and far-infrared light generated by the light filtering device during the light filtering process into the photobioreactor. The sunlight indoor guidance system for microalgae cultivation is characterized in that the microalgae cultivation environment can be effectively improved, the pollution is reduced, the cultivation cost is reduced, the microalgae cultivation efficiency is greatly improved, and the like.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104776394A

Optical path variable plate-type microalgae culture reactor

CN104711163A

Fecha de Publicación: 17 Jun 2015

Aplicación: CN201310691089A (13 Dec 2013)

Aplicante: DALIAN CHEMICAL PHYSICS INST

Abstract:

The present invention relates to an optical path variable plate-type microalgae culture reactor, which comprises a ventilation device and an optical path adjustable photo biological reaction system during a culture process, wherein the ventilation device comprises a flow meter, a ventilation pipe and an aeration device, and the introduced gas is air containing a certain concentration of carbon dioxide (0.04-10% by mass). According to the present invention, the culture device is the simple flat plate-type photobioreactor with the lined transparent plastic bag, and during the culture process, along with the increase of the microalgae cell concentration, the distance between the baffles of the plate-type reactor is changed so as to continuously change the optical path, such that the requirement of the algae cell growth on the optical energy can be met, and the reactor is especially for the culture using sunlight as the optical source.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104711163A

Pipeline-type photobioreactor for scale culture of microalgae

CN103602579B

Fecha de Publicación: 4 Mar 2015

Aplicación: CN201310609742A (27 Nov 2013)

Aplicante: QINGDAO XUNON BIOLOG ENGINEERING CO LTD

Abstract:

The invention provides a pipeline-type photobioreactor for scale culture of microalgae. The pipeline-type photobioreactor comprises a gas exchange tank (1), a process pump (8), a CO2 replenishing system and a photosynthesis pipeline array (9). According to the pipeline-type photobioreactor, the specific surface area of the reactor is effectively increased, the contradiction between increase of volume of a unit area of culture solution and attenuation of illumination of the culture solution in an existing pipeline reactor is effectively solved, the light energy utilization rate of the microalgae and the yield can be effectively increased, and the purposes of rapid, large-scale and high-density culture of the microalgae are achieved.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN103602579B

Referente a BioProcesos-Cultivo-Heterotrófico

Process for enrichment of microalgal biomass with carotenoids and with proteins

WO2015079182A1

Fecha de Publicación: 4 Jun 2015

Aplicación: FR2014053075W (28 Nov 2014)

Aplicante: ROQUETTE FRERES [FR]

Abstract:

The invention relates to a process for the enrichment, with carotenoids and proteins, of a biomass of a microalga cultivated under heterotrophic conditions, wherein said microalga is of the Chlorella genus, which comprises culturing said microalga in a minimum medium supplemented with a nitrogen source in organic form, preferably chosen from the group consisting of yeast extract, corn steep liquor, and a combination thereof.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/WO2015079182A1

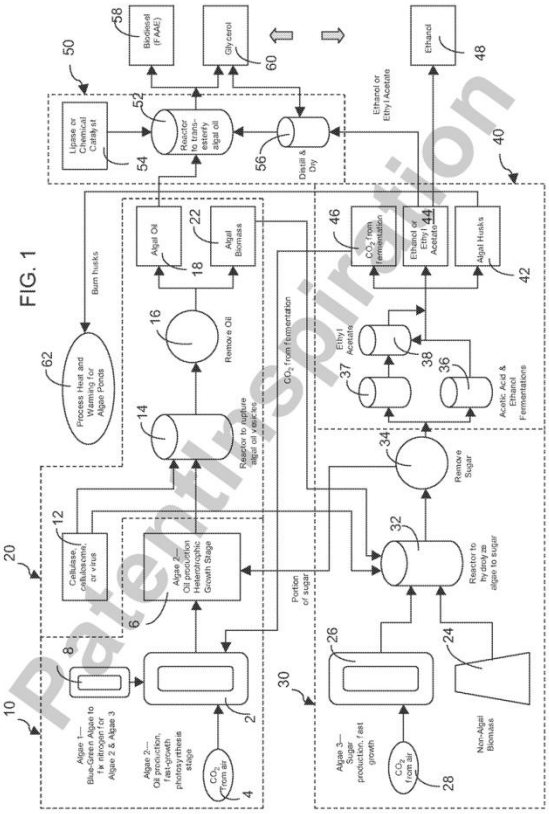
Two-stage process for producing oil from microalgae

US2015132812A1

Fecha de Publicación: 14 May 2015

Aplicación: US201414552325A (24 Nov 2014)

Aplicante: GENIFUEL CORP [US]



Abstract:

A process for production of biofuels from algae can include cultivating an oil-producing algae by promoting sequential photoautotrophic and heterotrophic growth. The method can further include producing oil by heterotrophic growth of algae wherein the heterotrophic algae growth is achieved by introducing a sugar feed to the oil-producing algae. An algal oil can be extracted from the oil-producing algae, and can be converted to form biodiesel.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/US2015132812A1

Economic and efficient spirulina platensis mixed culture method

CN103215212B

Fecha de Publicación: 11 Feb 2015

Aplicación: CN201310169326A (9 May 2013)

Aplicante: UNIV JIANGNAN

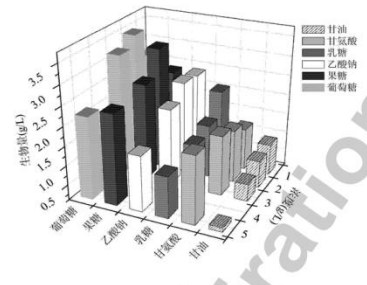


图 1

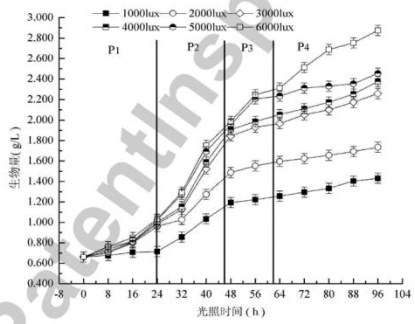


图 2

Abstract:

The invention provides an economic and efficient spirulina platensis mixed culture method, belonging to the technical field of microalga biology. During the growth process of spirulina platensis, the illumination intensity is controlled in stages, and glucose is fed as a heterotrophic carbon source, so that the technical problems that the spirulina platensis is limited by light intensity, concentration of an organic carbon source and the like during the culture process are solved, an optimal feeding way with most appropriate light intensity and carbon source in the mixed culture process is found, and high-efficient carbon fixation and fast growth of the spirulina platensis are realized.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN103215212B

Method for heterotrophic culture of microalgae by virtue of chicken manure degrading liquid

CN104152356A

Fecha de Publicación: 19 Nov 2014

Aplicación: CN201410366807A (30 Jul 2014)

Aplicante: UNIV JIANGSU TECHNOLOGY

Abstract:

The invention discloses a method for heterotrophic culture of microalgae by virtue of chicken manure degrading liquid. The method comprises the following steps: firstly, degrading chicken manure, namely degrading chicken manure diluting liquid at a rotary speed of 40rpm-60rpm to obtain low-nitrogen degrading liquid, and degrading the chicken manure diluting liquid at a rotary speed of 240rpm-260rpm to obtain high-nitrogen degrading liquid; secondly, inoculating microalga liquid obtained after culture on a shaking table into a culture tank, and performing heterotrophic culture on microalgae for 180-220 hours to finish the heterotrophic culture of the microalgae, wherein in the heterotrophic culture process, the high-nitrogen degrading liquid is added into a culture system in the early stage and the low-nitrogen degrading liquid is added into the culture system in the later stage. In the whole microalga culture process, the high and low-nitrogen degrading liquid of the chicken manure is directly added into culture liquid, and a nitrogen source does not need to be added, so that the efficiency is high and the energy and cost are reduced in the whole process.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104152356A

Heterotrophic algal high cell density production method and system

US7989195B2

Fecha de Publicación: 2 Aug 2011

Aplicación: US13213108A (3 Jun 2008)

Aplicante:
UNIV WASHINGTON STATE RES FDN [US]
CHI ZHANYOU
WEN ZHIYOU
FREAR CRAIG
CHEN SHULIN

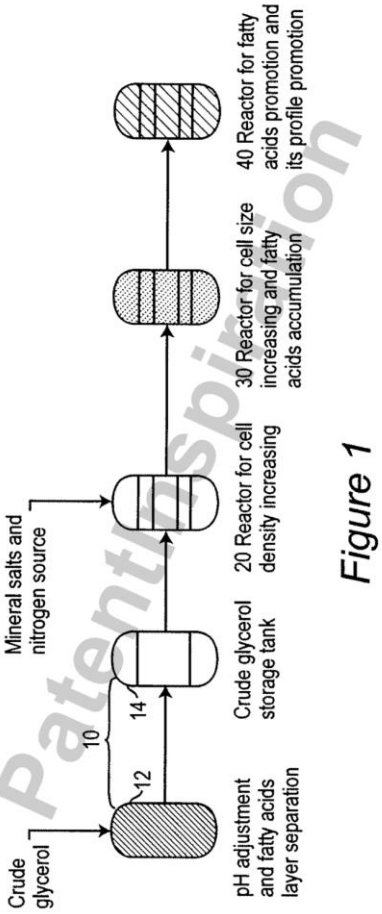


Figure 1

Abstract:

A multiphase culturing process for high density heterotrophic microalgal growth uses crude glycerol as the primary carbon source and produces ω-3 fatty acids. The process uses multiphase growth conditions that decouple the phases of increasing cell density and increasing cell size and fatty acid production. The entire process is integrated with biodiesel production.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/US7989195B2

Referente a BioProcesos-Cosecha-Floculación

Microalgae harvesting method using coupled microbial flocculation and air floatation

CN103103125B

Fecha de Publicación: 12 Aug 2015

Aplicación: CN201110352420A (10 Nov 2011)

Aplicante:
CHINA PETROLEUM & CHEMICAL
SINOPEC FUSHUN RES INST PET

Abstract:

The invention relates to a microalgae harvesting method using coupled microbial flocculation and air floatation. The method comprises the following steps: (1) preparing a microbial flocculating agent; (2) culturing microalgae; (3) harvesting the microalgae after culture, adding the microbial flocculating agent prepared in step (1), carrying out uniform stirring, standing an obtained mixture for settling and carrying out condensation and layering so as to obtain condensed microalgae liquid which is discharged from the bottom of an apparatus; and (4) allowing non-flocculated dilute microalgae liquid to enter into an air floatation tower for air floatation separation and collecting condensed microalgae liquid obtained in the air floatation tower from the upper part of the air floatation tower. According to the method provided by the invention, dense microalgae liquid is subjected to preliminary condensation and recovery at first, then an air floatation separation process is used, so the following problems are overcome: steps like post-treatment, separation and purification are more difficult because of great usage amount of the microbial flocculating agent when the microbial flocculating agent is individually used for recovery of the dense microalgae liquid, and an individual air floatation harvesting method is only applicable to recovery of low concentration microalgae liquid.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN103103125B

Process for continuously growing microalgae in autotrophic - mixotrophic cycle, with water and nutrient recycling

RO130238A0

Fecha de Publicación: 29 May 2015

Aplicación: RO201400330A (30 Apr 2014)

Aplicante: INST NAŢIONAL DE CERCETARE DEZVOLTARE PENTRU CHIMIE ŞI PETROCHIMIE ICECHIM [RO]

Abstract:

The invention relates to a process for continuously growing algae while obtaining a biofuel, biocarbon and an algal extract with complex effects on crop plants. According to the invention, the process consists in continuously growing microalgae in a system comprising two cascade-operating photo-bio-reactors, in autotrophic - mixotrophic cycle, separating the grown algal biomass from the growth media by electro-flocculation and flotation, extraction of lipids which are further subjected to transesterification into biofuel, the recovered liquid medium being then mixed with the recovered raw glycerine and the autotrophic biomass hydrolysates, resulting in a mixture to be used in the mixotrophic culture of algae, wherefrom the enzymatic hydrolysis-resistant biomass is converted into biocarbon to be used in the purification of the recovered liquid medium which is further completed with mineral nutrients and used in the process, in the end, an enzymatic extract with complex effects on crop plants being obtained from the mixotrophic biomass.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/RO130238A0

Cascade, efficient and energy-saving device for harvesting microalgae biomass and method thereof

CN104403928A

Fecha de Publicación: 11 Mar 2015

Aplicación: CN201410635955A (12 Nov 2014)

Aplicante: INST OF HYDROBIOLOGY CAS

Abstract:

The invention discloses a cascade, efficient and energy-saving method for harvesting microalgae biomass. The method comprises the following main steps: a prepared flocculant and a microalgae liquid culture are uniformly mixed; the mixed solution enters a sedimentation tank for sedimentation; a part of a supernatant is removed; the residual mixed solution is pumped through a peristaltic pump into a tubular bowl centrifuge to carry out algae-water separation; and finally, the microalgae biomass is harvested. The invention also discloses a cascade, efficient and energy-saving device for harvesting the microalgae biomass. Main devices used contain a flocculation basin, a sedimentation tank, a centrifugal device and a power controller. Flow velocity of an introduced sample is controllable. Sample processing is continuous and sample handling capacity is large. The method and the device are suitable for large-scale production and are suitable for harvesting the microalgae biomass at large scale.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104403928A

Continuous flocculation deflocculation process for efficient harvesting of microalgae from aqueous solutions

US2013102055A1

Fecha de Publicación: 25 Abr 2013

Aplicación: US201213656691A (20 Oct 2012)

Aplicante:
REGENTS THE UNIVERSITY OF TE BOARD OF [US]
UNIV TEXAS [US]

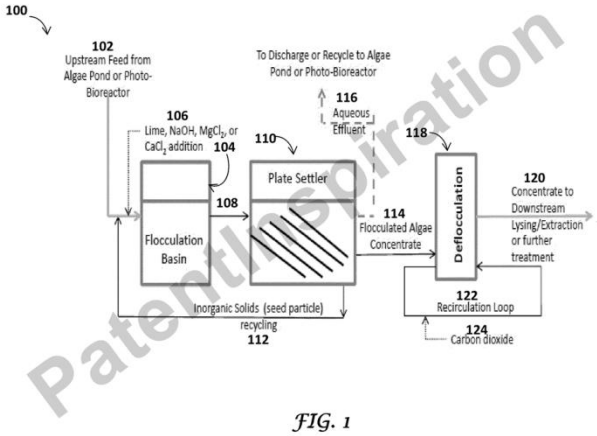


FIG. 1

Abstract:

A continuous process for efficiently harvesting microalgae from aqueous systems is described herein. The method and apparatus of the present invention allows continuous harvesting of algae from a variety of source waters including saltwater, brackish water, fresh water, and treated wastewater. High concentration factors are achievable and the system produces a deflocculated product that is readily processed for biofuel or pharmaceutical applications. The process of the present invention does not add contaminants that can limit the downstream usage possibilities for the algae concentrate produced. The effluent water from the process is suitable for conventional discharge or recycling to the growth system. The process of the present invention is inexpensive, scalable, and generates useful effluent water and algae concentrate as products.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/US2013102055A1

Referente a BioProcesos-Cosecha-Flotación

Aquatic based microalgae production apparatus

IN2524MUN2014A

Fecha de Publicación: 17 Jul 2015

Aplicación: IN2524MUN2014A (11 Dec 2014)

Aplicante: REDFORD DANIEL S [US]

Abstract:

An aquatic based algae production apparatus employing a microalgae production support assembly and a cluster of six floating closed loop flatbed C02/02 gas permeable photobioreactors for microalgae industrial production are disclosed. The apparatus s bioreactors are submerged in the proximity of the water surface mark for maximum light exposure and for C02/02 continual diffusion. A microalgae processing and control assembly monitors the algae growth for each photo bioreactor in the cluster and cyclically harvests the microalgae. The microalgae are transferred into a submerged variable volume storage tank. Solar photovoltaic panels supply the energy required for the operation of the apparatus. Swivel electrical propellers attached to the bottom of the apparatus protective outer barrier control the apparatus s water deployment.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/IN2524MUN2014A

Method and system for efficient harvesting of microalgae and cyanobacteria

WO2011040955A1

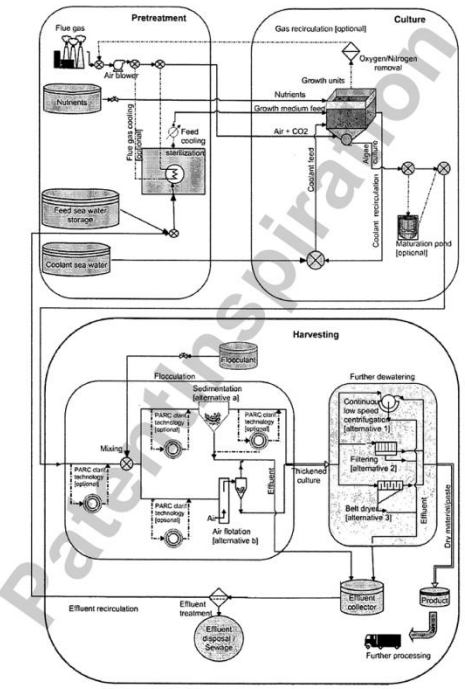
Fecha de Publicación: 7 Apr 2011

Aplicación: US2010002632W (29 Sep 2010)

Aplicante:

SCHLESINGER AMI [IL]
EISENSTADT DORON [IL]
EINBINDER SHAI [IL]
GRESSEL JONATHAN [IL]

Figure 1



Abstract:

The high-speed centrifugation heretofore required for harvesting micro algae and cyanobacteria cultured for biofuels and other co-products is a major cost constraint. Mixing algae/cyanobacteria at high-density culture with far less alkali than previously assumed is sufficient to flocculate the cells. The amount of flocculant required is a function of the logarithm of cell density, and is not a linear function of cell density as had been thought. The least expensive alkali treatments are with slaked limestone or dolomite (calcium hydroxide and magnesium hydroxides). Further water can be removed from the floe by sedimentation, low speed centrifugation, dissolved air flotation or filtration, prior to further processing to separate oil from valuable co-products.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/WO2011040955A1

Referente a BioProcesos-Cosecha-Filtración

Automatic system for harvesting and drying microalgae

KR101550992B1

Fecha de Publicación: 7 Sep 2015

Aplicación: KR20130150420A (5 Dec 2013)

Aplicante: HYUNDAI MOTOR CO LTD [KR]

Abstract:

The present invention relates to a system for producing microalgae in a dried biomass form by using hollow fiber membranes and near infrared ray, which is allowed to decrease moisture retention with use of membrane filter methods and maximizes effects of decreasing moisture retention by using near infrared ray while consecutively performing a microalgae collecting process and a microalgae drying process, thereby consecutively mass-producing good quality of dried biomass quickly.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/KR101550992B1

Method and culture device for coupling biogas fermentation with microalgae culture

CN104762331A

Fecha de Publicación: 8 Jul 2015

Aplicación: CN201510148577A (31 Mar 2015)

Aplicante: SOUTH CHINA SEA INST OCEANOLOG

Abstract:

The invention discloses a method and a culture device for coupling biogas fermentation with microalgae culture. The method comprises the following steps: carrying out biogas fermentation to obtain biogas and biogas slurry; filtering the biogas slurry to remove solid granules, diluting the biogas slurry to serve as a microalgae culture medium, filling the diluted biogas slurry in a microalgae culture reactor to serve as the microalgae culture medium, filling the bottom of the microalgae culture solution in the microalgae culture reactor with biogas to serve as a carbon source, culturing under a light condition, and drying and removing water vapor from the biogas flowing out from the microalgae culture reactor for use; when harvesting the microalgae, dewatering to obtain microalgae sludge and culture solution, extracting biolipid, phycocyanin and other products with high added values from the microalgae sludge, and carrying out biogas fermentation on the residual microalgae residues and the culture solution in a biogas digester as biogas fermentation materials. The entire process of the method disclosed by the invention is driven by the solar energy, and carbon, nitrogen, phosphorus and other microelements are

recycled, thereby satisfying the requirements of green energy source and sustainable development.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104762331A

Method for processing oilfield wastewater and fixing CO2 (carbon dioxide) by using microalgae

CN103112993B

Fecha de Publicación: 25 Dic 2013

Aplicación: CN201310037965A (31 Jan 2013)

Aplicante:

SHENGLI OILFIELD SHENGLI EXPLORATION & DESIGN RES INST CO LTD
SHANDONG SAIRUI PETROLEUM TECHNOLOGY DEV CO LTD

Abstract:

The invention provides a method for processing oilfield wastewater and fixing CO2 (carbon dioxide) by using microalgae; the method comprises the following steps of: using oilfield wastewater in which the crude oil content is lower than 10mg/L, the TOC (total organic carbon) is lower than 40mg/L and the COD (chemical oxygen demand) is lower than 100mg/L for microalgae cultivation and carbon fixing, introducing CO2 directly into the wastewater, selecting the microalgae with high stress resistance, high oil content and high function in degrading petroleum hydrocarbon according to the water quality of the oilfield wastewater introduced with the CO2, combining the large-scale cultivation of the microalgae with the wastewater treatment, building a large-scale cultivation system by using five stepped microalgae processing ponds which are connected with each other, and then adjusting the water temperature to be 20 DEG C to 35 DEG C; a silicon carbide micro-filtration membrane is used for harvesting, and 10-20% of the harvested microalgae is used as algae seed for the algae liquid cultivation of the next batch and 70-90% of the harvested microalgae is used for preparing biodiesel. The wastewater temperature which is the most proper for the growth of the algae is controlled by controlling the content of fresh wastewater, and the full-year stable and continuous running of the oilfield wastewater processing and CO2 fixing system is achieved.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN103112993B

Photoautotrophic growth of microalgae for omega-3 fatty acid production

WO2008013548A2

Fecha de Publicación: 31 Ene 2008

Aplicación: US2006031418W (14 Aug 2006)

Aplicante:

PARRY NUTRACEUTICALS LTD [IN]
THOMAS SWATI SEBESTIAN [IN]
KUMARAVEL SWAMINATHAN [IN]

Abstract:

The invention provides methods of cultivating microalgae photoautotrophically outdoors to prepare concentrated microalgae products containing eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) docosahexaenoic acid, two long-chain polyunsaturated fatty acids found in fish oil that are very important for human and animal health. It also provides concentrated microalgae products containing EPA and DHA and purified lipid products containing EPA and DHA purified from microalgae. One embodiment provides a concentrated microalgae composition prepared by a process comprising: (a) cultivating microalgae photoautotrophically outdoors in open ponds under filtered sunlight in continuous or batch mode at a dilution rate of less than 35% per day; (b) harvesting the microalgae in exponential phase when cell number is increasing at a rate of at least 20% of maximal rate; and (c) concentrating the microalgae; wherein at least 40% by weight of lipids in the microalgae are in the form of glycodiacylglycerides, phosphodiacylglycerides, or a combination thereof and at least 5% by weight of fatty acids are DHA, EPA, or a combination thereof.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/WO2008013548A2

Referente a BioProcesos-Secado

Production technology of cell wall-broken algae powder of haematococcus pluvialis

CN104862230A

Fecha de Publicación: 26 Ago 2015

Aplicación: CN201510304563A (4 Jun 2015)

Aplicante: WANG TIANLI

Abstract:

The invention belongs to the field of microalgae biotechnology, and relates to a production technology of cell wall-broken algae powder of haematococcus pluvialis rich in antioxidant astaxanthin bioactive substances. The production technology comprises the following four steps: step one, cells of haematococcus pluvialis are mixed with purified water to form a flowing feed liquid, the feed liquid is milled repeatedly by a milling machine, so that the mass density of tissues of cell walls is loosened, parts of the fibrous matters of tissues of the walls are peeled off, and the cell walls become thin and brittle; step two, the milled feed liquid is rinsed or dehydrated to form mashed cell algae by using a centrifuge or a frame filter, and then the mashed cell algae is mixed with purified water to form flowing feed liquid without peeled-off substances; step three, a high-pressure cell wall-breaking unit is used for breaking the walls and is composed of a feed cooler, a high-pressure cell wall-breaking machine and a discharge cooler, and the wall-breaking process is performed under temperature-controllable conditions; step four, wall-broken feed liquid is fed into a drying tower through a stainless steel pipe and is subjected to spray drying so as to form the cell wall-broken algae powder. The production technology is efficient, rapid, additive-free and high in purity of the cell wall-broken algae powder, can effectively protect the bioactive ingredients, and integrates the wall breaking process and the process of drying to form the powder.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN104862230A

Large-scale microalgae separation, collection and drying equipment

CN103555567B

Fecha de Publicación: 8 Jul 2015

Aplicación: CN201310506933A (24 Oct 2013)

Aplicante: BIOCHEMICAL ENG COLLEGE BJ

Abstract:

The invention discloses large-scale microalgae separation, collection and drying equipment. The large-scale microalgae separation, collection and drying equipment comprises a feed hopper, a material conveying system, a blast heating system, a collection device and a filter strip cleaning tank. The equipment can be used for continuously finishing algae liquid dehydration, separation, drying and collection processes. The problem of small-size and high-water-content large-scale recovery of particles such as energy microalgae, edible microalgae and medicinal microalgae is solved.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN103555567B

Method and device for processing microalgae

CN102559370B

Fecha de Publicación: 10 Jun 2015

Aplicación: CN201110435654A (22 Dec 2011)

Aplicante: ENN RES & DEV CO LTD

Abstract:

The invention provides a method for processing microalgae. The processing method includes placing microalgae liquid in an environment with a normal temperature and pressure, increasing the temperature and pressure of the environment of the microalgae liquid, continuously subjecting the microalgae liquid to the environment after the temperature and pressure are increased, and directly transferring the microalgae liquid to a vacuum environment from the environment. The invention further provides a device for preparing the microalgae, which includes a microalgae liquid storage tank used for storing the microalgae liquid at the normal temperature and under the normal pressure, a high-pressure pump used for pressurizing the microalgae liquid storage tank, a heater used for heating the microalgae liquid storage tank, a vacuum container with a vacuum pump, which is empty inside and used for containing the microalgae liquid obtained from the microalgae liquid storage tank, and a buffer tank used for containing water discharged from the vacuum container. According to the method and the device for processing microalgae, the collecting, wall-breaking and drying of the microalgae are achieved simultaneously or performed by one step and the extraction rate of microalgae oil after wall-breaking can be reached above 90%. The method and the device for processing microalgae have the advantages of simple process, high wall-breaking efficiency, low energy consumption, and the like.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN102559370B

Referente a BioProcesos-Extracción-Soxhlet

Extraction method for microalgae grease

CN102816636A

Fecha de Publicación: 12 Dic 2012

Aplicación: CN201210259778A (25 Jul 2012)

Aplicante: UNIV JIANGSU SCIENCE & TECH

Abstract:

The invention discloses an extraction method for microalgae grease. The method comprises the following steps: (1) preparation of a sample: a step of collecting microalgae cells through centrifugation and then carrying out freeze drying so as to obtain dry microalgae powder; (2) ultrasonic pretreatment: a step of mixing the dry microalgae powder with alcohol and carrying out ultrasonic treatment; and (3) Soxhlet extraction: a step of adding a material obtained after treatment in step (2) into a Soxhlet extractor, carrying out extraction in a boiling water bath for 3.5 h and then carrying out filtration, separation and reduced pressure concentration so as to obtain the microalgae grease. The method provided by the invention can obviously improve preparation processes for the microalgae grease, is beneficial for realization of industrial production and can speed up preparation, development and utilization of the microalgae grease.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN102816636A

Referente a BioProcesos-Extracción-Supercrítica

Method for extracting microalgal oil by supercritical CO2 isothermal transformation technology

CN102643714A

Fecha de Publicación: 22 Ago 2012

Aplicación: CN201210061112A (9 Mar 2012)

Aplicante: UNIV GUANGXI

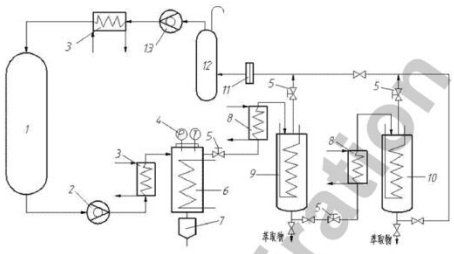


图 1

7

Abstract:

The invention relates to a method for extracting microalgal oil by supercritical CO2 isothermal transformation technology. The method comprises the steps of: removing impurities in dried microalgae, and then crushing and grinding; putting the ground microalgae dry powder into an extraction kettle, filling supercritical CO2 into the extraction kettle, and extracting under the conditions that the pressure is 12-25MPa, the temperature is 34-42 DEG C and the time is 150-180min; carrying out isothermal decompression separation on the supercritical CO2 containing solute successively by two stages of separators; and collecting fatty acid oil extract separated out from the bottoms of the two stages of separators to obtain the product. According to the method, organic solvent is not needed in the whole process, so that no residual solvent exits in the extract, and oxidation and thermal cracking are not caused in the extraction process; the oil is high in yield and purity; the product is excellent in quality; the whole set of technology is simple in operation and does not have corresponding post-processing requirement. Meanwhile, the method prevents the microalgal oil from poisoning the human body and polluting the environment in the extracting process.

Dirección:

http://www.patentinspiration.com/redirect?url=/patent/CN102643714A

Eventos y Cursos

Congresos

European Algae Biomass Conference.
April 20 - 21. Berlin, Germany.
http://www.wplgroup.com/aci/event/european-algae-biomass-conference/

European Networks Conference on Algal and Plant Photosynthesis.
April 26 - 29th of. Malta.
http://encapp2016.eu/home/

The 6th International Conference on Algal Biomass, Biofuels and Bioproducts.
June 26 - 29. Paradise Point, San Diego. EEUU.
http://www.algalbbb.com/

Euro Global Summit and Expo on Biomass.
August 08-09. Birmingham, UK.
http://biomass.global-summit.com/europe/

10th ISEB Conference 2016.
June 01-03 Barcelona, Spain.
http://www.iseb2016.com/es/

2nd International Congress and Expo on Biofuels & Bioenergy.
August 29-31. Sao Paulo, Brazil.
http://biofuels-bioenergy.conferenceseries.com/call-for-abstracts.php

Algae Biomass Summit.
October 23 - 26. Phoenix, Arizona. EEUU.
http://www.algaebiomasssummit.org/?page=Agenda

The 9th Asia-Pacific Conference on Algal Biotechnology. Algae for food, feed, fuel and beyond.
November 15-18. Bankhok, Thailand.
http://www.apcab2016.com/overview.asp

ALGAEUROPE
December 06 - 08 2016, UK.
http://algaecongress.com/

Workshop/ Talleres y cursos

EABA Workshop Novel Foods 2nd Edition
April 1st. Bruselas, Bélgica
http://www.eaba-association.org/en/events/

ATP3 Education and Training Workshops
ATP3 offers a diverse range of topics pertaining to the management and processing of microalgal cultures, and uses of their products. Laboratory and field training are led by highly-trained scientists and engineers. Principal instructors include: Dr. Milt Sommerfeld (ASU/AzCATI), Dr. Thomas Dempster (ASU/AzCATI), and Dr. Schonna Manning (UT-Austin/UTEX). For more information about these and future workshops, please visit www.atp3.org/education

Feb 15-19: Winter ATP3 Workshop, AzCATI - Routine Measurement and Biochemical Analysis of Microalgal Cultures.
This workshop provides an introduction to the diversity of microalgae and common analytical methods for the evaluation of microalgal biomass. Topics presented are relevant to those interested in an overview of microalgal biochemistry, performing routine laboratory procedures and data analysis. Field training will include sample collection and handling techniques from ponds and photobioreactors.

May 16-20: Spring ATP3 Workshop, AzCATI - Principles and Processes: Algae Culture Maintenance, Production and Downstream Processing.
This workshop covers the fundamentals of selecting and managing microalgal cultures, culturing techniques, acquiring critical biomass measurements, an overview of high-value natural products, demonstrations of harvesting and processing technologies, and operation at the production scale.

Aug 22-26: Summer ATP3 Workshop, UTEX - Microalgal Culture Management & Strain Selection.
This workshop will provide an introduction to the major classifications of microalgae, including their diversity, nutrition, ecology, and biochemical content. Topics are designed for advanced students, instructors and trainees who are interested in obtaining a broad survey of the microalgae and the field of applied phycology.

Workshop are hosted at AzCATI, a nationally-recognized algae testbed facility, where participants can explore every aspect of growing microalgae at the production scale. The summer workshop will take place at the UTEX Culture Collection of Algae located at the University of Texas at Austin.
http://utex.org/blogs/training-workshops
http://www.psaalgae.org/workshops-and-courses/
National Center for Marine Alage and Microbiota

NCMA Training Courses
May 15-20. Algal Culturing Techniques Course.
The Provasoli-Guillard National Center for Marine Algae and Microbiota (NCMA) offers an Algal Culturing Techniques Course. The course is held at Bigelow Laboratory for Ocean Sciences Research and Education campus in East Boothbay, ME. The course is designed for graduate students, faculty members, aquaculturists, biotech professionals and anyone else interested in learning algal culturing techniques.
https://ncma.bigelow.org/training-courses

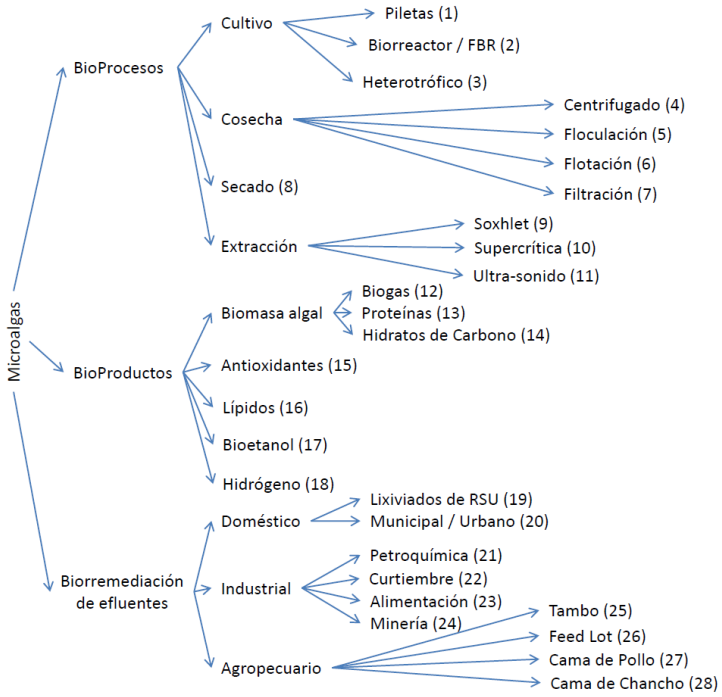
Freshwater Algae Identification Intensive Summer Workshop.
Summer Workshop: June 15 to June 29, 2016
This workshop will embark on a study of the largest, most diverse, and arguably the most important group of plants on earth: the algae. NY, USA.
http://www.fordham.edu/info/25156/freshwater_algae_identification_intensive_summer_workshop

Biología y Taxonomía de Diatomeas Continentales. UBA.
Maidana Nora Irene, nim@bg.fcen.uba.ar; postgrado.bbe@bg.fcen.uba.ar.
http://www.dbbe.fcen.uba.ar/objetos/biologia-y-taxonomia-de-diatomeas-continentales-P174.html

Taller de identificación de Diatomeas Continentales, UBA.
Este curso teórico y práctico brinda actualización de los conocimientos sobre la biología, taxonomía y ecología de las diatomeas (Bacillariophyceae), con énfasis en los géneros que habitan las aguas continentales. Se estudian las Bacillariophyceae actuales y fósiles, tanto en los aspectos de su biodiversidad como en los limnológicos y micropaleontológicos, así como sus aplicaciones en diversos campos de la ciencia y la industria.
Carga horaria: 60 hs.
Duración: quincenal.
Frecuencia de dictado: anual.
Maidana Nora Irene, nim@bg.fcen.uba.ar; postgrado.bbe@bg.fcen.uba.ar;
http://www.dbbe.fcen.uba.ar/objetos/taller-de-identificacion-de-diatomeas-continentales-P193.html.

Árbol de categorías

Español



Inglés