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Posters

Jasmiina Haverinen et al., J Bioremediat Biodegrad 2018, Volume 9
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Capillary electrophoresis in the analysis of volatile fatty acids, ammonium, K, Ca and Mg from mesofilic anaerobic digestion samples

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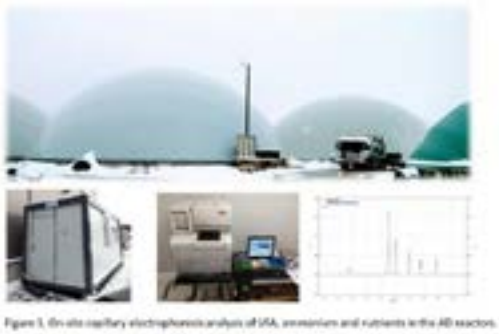
[3]Unit of Measurement Technology, Finland

Statement of the Problem: Biogas process monitoring help to maintain stable process and costs of basic monitoring are often much lower than the costs with re-establishing a destabilised plant. Reactor acidification through reactor overload is one of the most common reasons for process deterioration in anaerobic digesters (ADs): A build-up of volatile fatty acids (VFAs) decrease pH and result in toxic conditions. Ammonia ensure supply of nitrogen as nutrient for biomass and increase system's buffer capacity, but elevated NH4 concentration causes toxic effects. To obtain accurate monitoring results, sampling, sample pre-treatment need to be controlled. This may be a challenge when plant is located far away from the laboratory. In this study, a capillary electrophoresis (CE) was utilized in the analysis of individual VFAs, ammonium, and nutrients (K, Ca, Mg) from the AD samples obtained from biogas factory. On-site monitoring of the analytes was performed to obtain fast analysis and minor sample storage and transportation times. In addition, longer chain fatty acids and bacterial profiles of the samples were studied.

Methodology & Theoretical Orientation: Samples were collected in biogas plant consisting three separate mesofilic AD reactors (4000 m3 each) where the main feedstock was swine slurry together with complex mixture of agricultural plant and animal wastes. Samples were diluted in water prior to CE analysis. The effect of sample storage in RT and -18C was studied. Long chain fatty acids were analysed by GC-MSD. Bacterial profiles were analysed based on their DNA (16SrDNA).

Findings: Acetic acid decreased fast when sample was stored in a room temperature. Correlation was observed between VFAs and long chain FAs concentrations as well as bacterial profiles.

Conclusion & Significance: CE was utilized successfully and is attractive method for the analysis of separate VFAs, NH4 and nutrients in the biogas production site. Samples should be analysed in the sampling date if stored in RT or freezed for longer storage time.



Biography

Jasmiina Haverinen, (Project researcher, M.Sc.)in the Kajaani University Consortium, Unit of Measurement Technology (MITY), which operates under University of Oulu, Finland. She has been working in the bio fermentation, food, and environmental sectors co-operating closely with companies.

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Benjamin Shepherd et al., J Bioremediat Biodegrad 2018, Volume 9
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Development of a novel liquid-inerted microwave pyrolysis system

Benjamin Shepherd and **John P Robinson**
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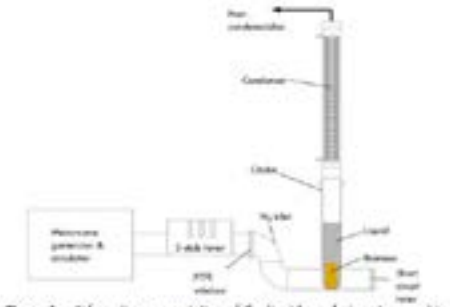
Pyrolysis is the thermochemical decomposition of biomass under inert conditions, into gas, oil and char. Microwave-pyrolysis, which offers direct inherent heating advantages not provided by conventional heating, is an expanding area of research. However, concerns exist with current state-of-the-art of microwave-pyrolysis systems used by researchers, as they typically have low intensity microwave-fields, are arcing-prone and require a significant amount of inert gas. As such, currently there is limited energy mass-balance information available due to the nature of these microwave reactors, which is fundamentally needed to support the scalability potential of microwave-pyrolysis. In an effort to overcome the aforementioned issues, a solvent inerted microwave-pyrolysis process has been developed and is presented here, offering benefits over gas microwave-pyrolysis. These include: prevention of thermal-runaway as the solvent maintains the biomass between 300-500°C due to increased thermal transfer, prevention of volatile secondary degradation reactions, provides heterogeneous heating-profiles enabling larger samples to be processed. An inerting gas is not needed as volatiles are quenched directly into the solvent, yielding bio-oil, reducing gas capture requirements and lowering process unit-costs. This presentation will focus on the screening of nine solvents used to inert the pyrolysis of sycamore feedstock in a microwave-system, based on microwave transparency/absorbency, boiling points, cost, environmental safety. Preliminary findings suggested that energy requirements for pyrolysis are not significantly increased, selective depolymerisation of cellulose and hemicellulose is possible, pyrolysis liquid yields can be as high as 70% of the bulk mass loss from the sample, and results fall in line with mathematic models. This allows for potential of scale-up, and different pyrolysis liquid compositions to be compared to conventional and gas-inerted microwave-pyrolysis. Future research and development, including: establishing how the solvent choice affects phase separation, identification of key components in the oil and further processing scale-up, mass and energy balances and mathematical models will also be discussed in this presentation.



Biography

Benjamin Shepherd is a 2nd year PhD Researcher at the University of Nottingham working under the supervision of Dr. John Robinson and Dr. Liam Ball. After obtaining a MEng degree in Chemical Engineering in 2015 from the University of Nottingham, he decided to pursue research. His current research focuses on the development of a novel microwave pyrolysis system that employs superior temperature control using inert liquid instead of gas. He performs a combination of theoretical and empirical research in order to help underpin the process envelope for this new system.

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Deivison Silveira Santos de Jesus, J Bioremediat Biodegrad 2018, Volume 9
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Design automation of the manufacturing process of a mini-biodiesel plant

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The increasing pollution in the atmospheric layer has meant world-wide temperature variations, causing the melting of icecaps and floods, among other environmental factors. This change in temperature has been mainly caused by the indiscriminate emission of CO_2, especially due to the rising number of vehicles in circulation. Researchers have identified that, among other types of fuel, diesel has the highest level of CO_2 emission. Hence the need for the development of biodiesel, produced from oleaginous plants, aimed at reducing the emission of this harmful gas into the atmosphere, besides using renewable resources. However, as in any automation process, it is necessary to have sensors, actuators and controllers, which together perform the automation and control of the production process. Besides that, there are other process variables to be accounted for, such as temperature, flow and level. Considering such concept, and within the academic context, the creation process of a mini biodiesel plant will be described.

Fig. 13. – Automation and Control Project of the Mini Biodiesel Plant - FAMEC. Source: FAMEC-MUB-02-001

Recent Publications

1. BEGA, E.A. KOCH, R. FINKEL. V.S.etal.Industrial instrumentation. Publisher Interciência: IBP. 3rd Edition. Rio de Janeiro, 2011.
2. BRAFMAN, I. Econometric model for the projection of apparent fuel consumption in Brazil - otto and diesel. 2009. 103 f. Dissertation (Master degree) - Faculty of Economics and Finance Ibmec, Rio de Janeiro, 2009.
3. CONAB - NATIONAL COMPANY OF SUPPLY. Ethanol as a new universal fuel: statistical analysis and projection of domestic consumption and export of Brazilian ethyl alcohol from 2006 to 2011. Brasília, 2008.
4. D'AVILA, L. A. Limits of biodiesel production in Brazil. BIOCOM-4th national biofuels symposium. Chemical School of UFRJ, LABCOM-Laboratory of Fuels and Petroleum Derivatives. Rio de Janeiro, May 19 and 20, 2011
5. METROPOLITAN FACULTY OF CAMAÇARI. Pedagogical project of the control and automation engineering course. Camaçari, 2012. 182p

Biography

Deivison Silveira Santos de Jesus Master's degree in Mechanical Engineering and Automotive Industrial Systems, Postgraduate in Reliability Engineering, Control and Automation Engineer, Electro technical Technician. He has professional experience in the area of management of electrical maintenance in industrial equipment and quality engineering in the automotive area. It is also Black Belt certifying 7 Green Belt in the year 2017 .

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Chikako Asada et al., J Bioremediat Biodegrad 2018, Volume 9
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Renewable resource-based material synthesized from lignocellulosic biomass

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Lignocellulosic biomass is made up three main component, i.e. cellulose, hemicelluloses, lignin, and expected as an alternative resource of fossil resource. It is used to produce biofuels and biomaterials, and its increased use would lower environmental impacts such as the emission of greenhouse gases and fossil fuel depletion. In East Asia, disposable wooden chopsticks are used in restaurants, school cafeterias, and homes. The average annual amount of wooden chopsticks disposed of in Japan is about 90,000 t. Therefore, disposable wooden chopsticks can be considered as a promising candidate for raw materials of useful fuel and chemicals production. In this study the total biorefinary process of lignocellulosic biomass was developed using high temperature and pressure steaming and milling treatment (SM treatment). Biorefinery is a process that produce fuels, power, heat, and value-added chemicals from biomass using various pretreatment, extraction, separation, and conversion methods. The biorefinery concept is analogous to today's petroleum refinery, which produce multiple fuels and products from petroleum. We evaluated the efficient separation and utilization of woody structural components from waste BODE chopsticks by using SM treatment followed by water and acetone extractions. The water soluble material was converted into methane or functional food ingredients. Acetone soluble material (Low molecular weight lignin, Mn 1300, Mw 4300) was used as not only a raw material for the synthesis of lignin epoxy resin but also curing agent for curing reaction of epoxy resin. Residue after water and acetone extractions (Mainly cellulose component) was converted into methane or cellulose nanofiber. Furthermore, the mechanical and thermal properties of cured lignin epoxy resin and cellulose nanofiber were evaluated. As a result, we could show the mass balance of extracted and separated components from SM treated waste BODE chopsticks (Figure 1).

Recent Publications

1. Asada C, Sasaki C, Takamatsu Y, Nakamura Y (2015) Conversion of steam-exploded cedar into ethanol using simultaneous saccharification, fermentation and detoxification process. Bioresource Technology 176: 203-209.
2. Asada C, Basnet S, Otsuka T, Sasaki C, Nakamura Y (2015) Epoxy resin synthesis using low molecular weight lignin separated from various lignocellulosic materials. International Journal of Biological Macromolecules 74: 413-419.
3. Asada C, Sasaki C, Hirano T, Nakamura Y (2015) Chemical characteristics and enzymatic saccharification of lignocellulosic biomass treated using high-temperature saturated steam: Comparison of softwood and Hardwood. Bioresource Technology 182: 245-250.
4. Sasaki C, Yoshida Y, Asada C, Nakamura Y (2016) Total utilization of Japanese pear tree prunings: Extraction of arbutin and production of bioethanol. Journal of Material Cycles and Waste Management 18: 385-292.
5. Suzuki A, Sasaki C, Asada C, Nakamura Y (2017) Characterization of cellulose nanofiber from steam-exploded Japanese cedar. BioResource 12: 7628-7641.

Biography

Chikako Asada has her expertise in biomass effective utilization and bioremediation. She has completed her Ph.D. from Kanazawa University and studied about biochemical engineering in Faculty of Bioscience & Bioindustry, Tokushima University. Currently she is studying on lignocellulosic biomass conversion technologies, with expertise in synthesis of renewable-based materials from cellulose and lignin from plant biomass.

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Wen-Rong Xu et al., J Bioremediat Biodegrad 2018, Volume 9
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Chitin and shrimp shells liquefaction and their use in blend membranes

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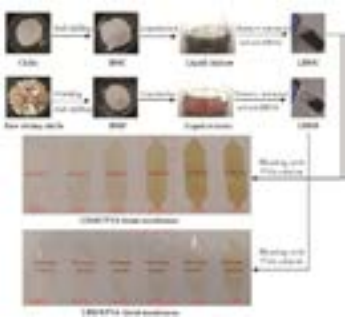
To expand the applications of fishing industrial wastes, the liquefaction technique was employed to convert chitin and shrimp shells into liquids, which were first further used to for the modification of polymer materials. Ball-mill treated chitin and shrimp shells were effectively liquefied into polyols, namely LBMC and LBMS, respectively, by liquefaction technique. FTIR, NMR and GPC analyses of liquefied products turned out that depolymerization and deacetylation reactions occurred during liquefaction process. LBMC/PVA and LBMS/PVA blend membranes with various LBMC or LBMS content were prepared and characterized by FTIR and SEM investigation. In addition, tensile strength, elongation at break, water content, degradation and antibacterial properties were thoroughly discussed. The mechanical property and thermal stability were greatly enhanced under the optimal optimized conditions of 0.6 wt% incorporation of liquefied chitin incorporation to PVA. In particular, the antibacterial activity was obviously improved after the incorporation of LBMC or LBMS.



Recent Publications

1. Jie Zhang, Wen-Rong Xu, Yu-Cang Zhang, Wei Li Jia-Dan Hu, Feng-Yi Zheng, Yang-Tian Wu (2018) Liquefied chitin/polyvinyl alcohol based blend membranes: preparation and characterization and antibacterial activity. Carbohydrate Polymers 180: 175-181.
2. Wen-Rong Xu, Guang-Jie Xia, Hak-Fun Chow, Xiao-Ping Cao, Dietmar Kuck (2015) Facile assembly of chiral metallosquares by using enantiopure tribenzotriquinacene corner motifs. Chemistry A European Journal 21(34): 12011-12017.
3. Wen-Rong Xu, Hak-Fun Chow, Xiao-Ping Cao, Dietmar Kuck (2014) Regiocontrolled synthesis and optical resolution of mono-, di-,and trisubstituted tribenzotriquinacene derivatives: key building blocks for further assembly into molecular squares and cubes. The Journal of Organic Chemistry 79(19):9335-9346.
4. Tao Wang, Yu-Fei Zhang, Qin-Qing Hou, Wen-Rong Xu, Xiao-Ping Cao, Hak-Fun Chow, Dietmar Kuck (2012) C3-symmetrical tribenzotriquinacene derivatives: optical resolution through cryptophane synthesis and supramolecular self-assembly into nanotubes. The Journal of Organic Chemistry 78(3):1062-1069.

Biography

Wen-Rong Xu has her expertise in chitin biomass conversion and applications, as well as organic synthesis and supramolecular chemistry. Her research group has successfully converted the chitin biomass into polyols through the simple and effective liquefaction method, and the resulting polyols were further used for the polymer modification. This research has opened a new way for the high-value added use of fishing industrial wastes.

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Young-Lok Cha et al., J Bioremediat Biodegrad 2018, Volume 9
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Improved Production of Cellulosic Bioethanol using *Miscanthus* Hydrolysate by Engineered *Saccharomyces cerevisiae*

Young-Lok Cha[1], Yong-ho Moon[2], Kwang-soo Kim[3], Ji-eun Lee[4], Da-eun Kwon[5] and **Yong-ku Kang[6]**
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In order to industrialize bioethanol based on cellulosic biomass, securing economic efficiency is very important. Until now, fermentation using glucose converted from cellulose through pretreatment and saccharification process was mainly performed, resulting in economically lower efficiency. The industrialization of strains capable of metabolizing xylose produced from cellulosic biomass was insufficient. Recently, an engineered *Saccharomyces cerevisiae* was developed for the effective bioethanol production. In this study, the yield of ethanol production was investigated using engineered *Saccharomyces cerevisiae* capable of xylose metabolism. The raw materials was pretreated with a twin-screw extrusion reactor under conditions: 0.5 M NaOH 27 L/h, biomass feeding 4.5 kg/h at 99 . The production of substrates for the ethanol fermentation was produced 120 g / L of glucose and 40 g / L of xylose through alkaline pretreatment and saccharifica-tion. In result, 65 g/L of ethanol in 48 h from *Miscanthus* hydrolysate was obtained using engineered *Saccharomyces cerevisiae* capable of xylose metabolism. In conclusion, the yield of ethanol production was improved 40% from 46 g/L to 65 g/L with same substrate.

Recent Publications

1. Young-lok Cha, Jungwoo Yang, Yuri Park, Gi Hong An, Jong-woong Ahn, Youn-ho Moon, Young-mi Yoon, Gyeong-dan u, In-hu Choi (2015) Continuous alkaline pretreatment of *Miscanthus* sacchariflorus using a bench-scale single screw reactor. Bioresource Technology 181:338-344.
2. Young-lok Cha, Jungwoo Yang, Sun-il Seo, Gi Hong An, Youn-ho Moon, Gyeong-dan Yu, Ji-Eun Lee, Jong-woong Ahn, Kyeong-Bo Lee(2016) Alkaline twin-screw extrusion pretreatment of *Miscanthus* with recycled black liquor at the pilot scale. Fuel 164:322-328.
3. Yamada R., Taniguchi N., TanakaT., Ogino C., Fukuda H., Kondo A. (2011) Direct ethanol production from cellulosic materials using a diploid strain of *Saccharomyces cerevisiae* with optimized cellulose exprestion. Biotechnol. Biofuels. 4:1-9.
4. Kim S. R., Park, Y.C., Jin Y.S., Seo J.H. (2013) Strain engineering of *Saccharomyces cerevisiae* for enhanced xylose metabolism. Biotechnol. Adv. 31:851-861.
5. Ye-Gi Lee, Yong-su Jin, Young-lok Cha, Jin-ho Seo (2017) Bioethanol production from cellulosic hydrolysates by engineered industrial *Saccharomyces cerevisiae*. Bioresocurce Technology 228:355-361.

Biography

Young-Lok Cha was a doctorate at the University of Hannover in Germany. He is working as a senior researcher at the National Institute of Crop Science, Rural Development Administration in Korea and his major is the development of lignocellulosic biomass conversion technology and biofuels production at pilot scale.

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Notes:

Kurt D. Thelen et al., J Bioremediat Biodegrad 2018, Volume 9
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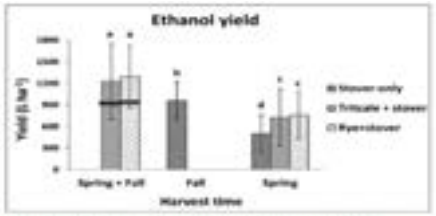
In field integration of winter cereals with corn stover to improve biomass yield and quality

Kurt D. Thelen[1] and **Monica Jean**[2]
[1]Michigan State University, USA
[2]Michigan State University, USA

The objective of this study was to evaluate the integration of winter cereal cover crops with corn stover to improve biomass and potential bioethanol yield. Cropping systems evaluated included 1) a corn stover experimental check; 2) early spring harvest of winter cereal's following a fall corn stover harvest; and 3) mixed stands of corn stover and winter cereals harvested together. Two winter cereals; cereal rye (Secale cereale L.), and triticale (Triticale hexaploide Lart.) were evaluated and no winter cereal crop was used as the experimental control). Two harvest time factors were evaluated including; a two-harvest system (fall followed by spring), and a one-harvest system (fall or spring). Spring-harvested corn stover ethanol content [EtOH] was the greatest (0.201 g g-1) followed by spring-harvested mixed feedstocks of rye + stover (0.175 g g-1) and triticale + stover (0.180 g g-1). Ethanol yield on a land area basis (L ha-1) decreased by 47% when stover-only feedstock was harvested in the spring compared to the fall. When only considering a single harvest system, incorporation of a winter cereal did improve ethanol yield by 242 L ha-1 at spring harvest. The two-harvest sequential system of a fall stover harvest followed by a spring, winter cereal harvest was the most productive with 41.8% greater ethanol yield when compared to the single harvest. Overall, the incorporation of a winter annual cereal with corn stover improved biomass and ethanol yield relative to stover-only feedstocks.



Recent Publications

1. Jean, M., K.D. Thelen, M. Quigley, D. Pennington. 2017. Improving biomass and ethanol yield by intercropping a winter cereal with corn. Agron J. 109:1-7
2. Robertson, G. Philip, Stephen K. Hamilton, Bradford L. Barham, Bruce E. Dale, R. Cesar Izaurralde, Randall D. Jackson, Douglas A. Landis, Scott M. Swinton, Kurt D. Thelen, James M. Tiedje. 2017. Cellulosic Biofuel Contributions to a Sustainable Energy Future: Choices and Outcomes. Science 356, eaal2324 (2017).
3. Sanford, G. R., Jackson, R. D., Oates, L. G., Robertson, G. P., Roley, S. S., & Thelen, K. D. (2017). Biomass production a stronger driver of cellulosic ethanol yield than biomass quality. Agron. J. 109:1911-1922. Laurenz, R., P. Tumbalam, S. Naeve, and K.D. Thelen. 2017.
4. Determination of isoflavone (genistein and daidzein) concentration of soybean seed as affected by environment and management inputs. J. Sci. Food Agric. Volume 97:10:3342–3347.
5. Tumbalam, P., K. Hard and K.D. Thelen 2016: Integrating winter annual cereal rye or triticale into a corn forage biofuel production system, Journal of Crop Improvement, 30:5:526-530.

Biography

Kurt D. Thelen, is a Professor at Michigan State University, USA. Dr. Thelen's research is focused on cropping systems agronomy with an emphasis on bioenergy and developing crop systems that increase food, feed, and energy production while safeguarding soil, air, water, and biodiversity.

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Jinying Yan et al., J Bioremediat Biodegrad 2018, Volume 9
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Sustainable Water-Energy-Environment Nexus for Thermal Bioenergy Conversion

Jinying Yan[1], **Zhi Zou**[1], **Hailong Li**[2], **Eva Thorin**[2] and **Daniel Billstrom**[3]
[1]KTH Royal Institute of Technology, Sweden
[2]Mälardalen University, Sweden
[3]Mälarenergi AB, Västerås, Sweden

A concept of sustainable water-energy-environment nexus has been developed for thermal bioenergy conversion processes as shown in Figures 1 and 2. Two case studies are performed in a biomass-fired CHP plant and a waste incineration unit, which intend to approve and implement the concept. The main results from the case study on stormwater issues in biomass-fired CHP plant show that the biomass fuel storage can play an important role in the sustainable development for the water-energy-environment nexus. It has been proved that the water adsorption capacity of wood chips can be used as a buffer to reduce water runoff, to extend the time for natural water evaporation, to receive the recycled runoff water without significant impacts on fuel quality. The runoff water absorbed by the biomass fuels could increase heat recovery and water reuse. The results also indicate that it is possible to achieve near zero water runoff and wastewater emissions in the tested plant area by an integration of stormwater management with the bioenergy conversion processes. Another case study is focused on a closed water loop in Waste-to-Energy (waste incineration) unit. The closed water loop can properly integrate the thermal energy conversion with an efficient flue gas cleaning, cost-effective water treatment and energy-effective water recovery. The investigation shows that it is possible to achieve a near zero wastewater discharge, which could also result in a significant amount of water recovery for internal usage. The two case studies demonstrate that sustainable water-energy-nexus could be set up in biomass energy conversion processes, which can provide good solutions handle important issues associate with water resource, energy efficiency and emissions to air and waters in bio energy conversion processes.

Figure 1. Illustration of the concept development for a sustainable water-energy-environment nexus in thermal bioenergy conversion processes

Figure 2. Minimising storm water discharge could be achieved by a water balance through water retention, water evaporation in biomass fuel storage. The recirculated runoff water by biomass fuels can further enhance heat and water recovery in flue gas condensation.

Recent Publications

1. Galanopoulos C, Yan J., Li H, Liu L (2018) Impacts of acidic gas components on combustion of contaminated biomass fuels. Biomass and Bioenergy 111:263-277.
2. Li H, Tan Y, Ditaranto M, Yan J, Yu Z (2017) Capturing CO2 from biogas plants. Energy Procedia 114:6030-6035.
3. Larsson M, Yan J, Nordenskjöld C, Forsberg K, Liu L (2016) Characterisation of stormwater in biomass-fired combined heat and power plant – Impacts of biomass fuel storage. Applied Energy 170:116-129.
4. Zhang X, Yan J, Li H, Chekani S, Liu L (2015) Investigation of integration between biogas production and upgrading. Energy Conversion and Management 102:131-139.
5. Sun Q, Li H, Yan J, Liu L, Yu Z, Yu X (2015) Selection of appropriate biogas upgrading technology - A review of biogas cleaning, upgrading and utilisation. Renewable & Sustainable Energy Reviews 51:521-532.

Biography

Zhi Zou is an PhD student of Chemical Engineering and Technology at KTH Royal Institute of Technology, Stockholm, Sweden.

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Sid Ahmed Kessas et al., J Bioremediat Biodegrad 2018, Volume 9
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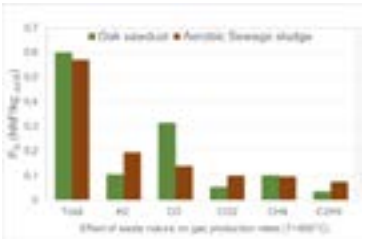
Pyrolysis of aerobic sewage sludge in fluidized bed reactor between 700 and 830 °C: Comparison with woody wastes

Sid Ahmed Kessas and **Mehrdji Hémati**
Laboratoire de Génie Chimique - CNRS, France

In this study, the pyrolysis of dry aerobic sewage sludge was carried out under nitrogen inert atmosphere in a dense fluidized bed reactor (2.5 m height, 0.214 m inner diameter). Firstly, the effects of pyrolysis temperature between 700 and 830°C on product distributions in terms of syngas, liquid and char and the gas composition were investigated. Results indicate that the increase of temperature leads to an increase in syngas yield and a decrease in tar yield. However, the char amount is not affected by temperature beyond 700°C. The gas composition is strongly changed by temperature. H_2/CO ratio increases from 1.15 at 700°C to 1.53 at 830°C. In addition, these runs were compared to experiments performed during pyrolysis of lignocellulosic biomasses (oak, pine and beach sawdust). Results show that the syngas yield produced with sewage sludge is comparable to that obtained with woody biomasses (0.57 Nm_3/kg daf, B at 800°C). The syngas composition is strongly affected by the nature and the composition of waste. The low oxygen content in the sewage sludge leads to the formation of a syngas rich in H_2, CH_4, and C_2Hx with a H_2/CO ratio higher than that obtained with woody wastes. The tar yield produced using sewage sludge (294 g/kg daf, B) is much more important than that obtained with woody wastes (60 g/kg daf, B for beech sawdust). According to these results, we proposed a pyrolysis reaction scheme by estimating stoichiometric coefficients related to different pyrolysis products. Finally, pyrolysis run carried out at 830°C was compared with another test performed under steam atmosphere. Results show that the presence of steam in reactor increases syngas yield & H_2/CO ratio from 0.65 to 0.88 Nm^3/kg daf and 1.53 to 2.02 respectively which reduces four times the tar yield. These results can be explained by concentration or steam partial pressure effect on tar reforming and water-gas shift reactions.



Recent Publications

1. Nipattummakul N, Ahmed II, Kerdsuwan S and Gupta A K (2010) Hydrogen and syngas production from sewage sludge via steam gasification. International Journal of Hydrogen Energy 35(21):11738–45.
2. Gomez-Barea A, Nilsson S, Vidal Barrero F and Campoy M (2010) Devolatilization of wood and wastes in fluidized bed. Fuel Processing Technology 91(11):1624–33.
3. Liu H, Hu H, Luo G, Li A, Xu M, Yao H (2013) Enhancement of hydrogen production in steam gasification of sewage sludge by reusing the calcium in lime-conditioned sludge. International Journal of Hydrogen Energy 38(3):1332–41.
4. Jaramillo-Arango A, Fonts I, Chejne F and Arauzo J (2016) Product compositions from sewage sludge pyrolysis in a fluidized bed and correlations with temperature. Journal of Analytical and Applied Pyrolysis 121:287–96.
5. Fonts I, Azuara M, Gea G and Murillo M B (2009) Study of the pyrolysis liquids obtained from different sewage sludge. Journal of Analytical and Applied Pyrolysis 85(1–2):184–91.

Biography

Sid Ahmed Kessas is a second year PhD student working on thermal & chemical conversion of wastes in fluidized bed reactors.

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Gasification characteristics of various biomass on thermal decomposition and steam reforming

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In order to suppress greenhouse gas emission and avoid global warming, utilization of biomass energy as a substitute for fossil fuels has attracted attention in recent years due to its renewability and carbon neutrality. Biomass gasification and pyrolysis has been investigated as one of the technologies for efficiently utilization of biomass energy. However, gasification characteristics of biomass varies according to the types of that. It is necessary to clarify the gasification characteristics of biomass due to practical use of various biomass. Here, the effects of various biomass on gasification behaviors are discussed. In this study, pyrolysis and gasification experiments were carried out using a batch type tubular reactor. Cedar and cypress of coniferous trees, eucalyptus of hardwood and bamboo of grass-type biomass were used as biomass feedstock. These biomass were pulverized and sieved to 0.5 to 1 mm. The sample was put on the ceramics boat and installed in the reactor. The reaction temperature was electrically controlled and set from 600 to 900 °C. The reaction atmosphere was inert only or both inert and steam, and the products were removed from the reactor by carrier gases. The experimental results showed that each biomass species had a different characteristic of gasification. The yields of char produced from the broadleaf eucalyptus and the grass-type biomass bamboo were higher than these of the coniferous wood. This tendency was common in all experimental conditions. The gas yield of bamboo was the lowest result in all biomass feedstocks. For all biomass, on the other hand, the gas yields increased and the tar yields decreased by the addition of steam. Especially improvement of the hydrogen yields was remarkable. It was suggested that steam reforming of the tar was promoted under the atmosphere containing water vapor.

Recent Publications

1. Tian Tian, Qinghai Li, Rong He, Zhongchao Tan, Yanguo Zhang (2017) Effect of biochemical composition on hydorogen production by biomass gasification. International journal of hydrogen energy 42:19723-19732
2. Dangzhen Lv, Minghou Xu, Xiaowei Liu, Zhonghua Zhan, Zhiyuan Li, Hong Yao (2010) Effect of cellulose, lignin, alkali and alkaline earth metallic species on biomass pyrolysis and gasification. Fuel Processing Technology 91:903-909
3. Asri Gani, Ichiro Naruse (2007) Effect of cellulose and lignin content on pyrolysis and combustion characteristics for several types of biomass. Renewable Energy 32:649-661
4. Toshiaki Hanaoka, Seiichi Inoue, Seiji Uno, Tomoko Ogi, Tomoaki Minowa (2005) Effect of woody biomass components on air-steam gasification. Biomass and Bioenergy 28:69-76
5. C. Franco, F. Pinto, I. Gulyurtlu, I. Cabrita (2003) The study of reaction influencing the biomass steam gasification process. Fuel 82:835-842.

Biography

Yuya Sakurai of Kogakuin University, Tokyo with expertise in Chemical Engineering.

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Notes:

Martin Staš et al., J Bioremediat Biodegrad 2018, Volume 9
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Chemical Characterization of Bio-oils from Cellulose, Hemicellulose and Lignin Pyrolysis

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Pyrolysis bio-oils are promising renewable feedstock that can be used as biofuels and for the production of valuable oxygen-containing chemicals. A more widespread use of bio-oils from a lignocellulosic biomass requires more detailed knowledge of their composition. In this work, we prepared bio-oils via the pyrolysis of cellulose, hemicellulose and lignin (i.e. main building blocks of lignocellulose). For the obtained bio-oils, we performed analyses of basic physical and chemical properties and a comprehensive chemical characterization also. The results obtained for these structurally less complex bio-oils can be helpful to understand the chemical composition of whole bio-oils in more detail.

Recent Publications

1. Staš, M., Kubička, D., Chudoba, J., and Pospíšil, M.: Overview of Analytical Methods Used for Chemical Characterization of Pyrolysis Bio-oils. Energy & Fuels 2014, 28, 385-402.
2. Staš, M., Chudoba, J., Kubička, D., and Pospíšil, M.: Chemical Characterization of Pyrolysis Bio-oil: Application of Orbitrap Mass Spectrometry. Energy & Fuels 2015, 29, 3233-3240.
3. Staš, M., Chudoba, J., Auersvald, M., Kubička, D., Conrad, S., Schulzke, T., and Pospíšil, M.: Application of orbitrap mass spectrometry for analysis of model bio-oil compounds and fast pyrolysis bio-oils from different biomass sources. Journal of Analytical and Applied Pyrolysis 2017, 124, 230-238.
4. Staš, M., Chudoba, J., Kubička, D., Blažek, J., and Pospíšil, M.: Petroleomic Characterization of Pyrolysis Bio-oils: A Review. Energy & Fuels 2017, 31, 10283-10299.
5. Kochetkova, D., Blažek, J., Šimáček, P., Staš, M., and Beňo, Z.: Influence of rapeseed oil hydrotreating on hydrogenation activity of CoMo catalyst. Fuel Processing Technology 2016, 142, 319-325.

Biography

Martin Staš obtained his MSc. degree in Analytical chemistry in 2011 and Ph.D. in Chemistry and Technology of Fuels and Environment in 2015 at the University of Chemistry and Technology Prague (UCTP). Since 2014, he has been working as a scientific co-worker at the Department of Petroleum Technology and Alternative Fuels at UCTP. For four years, he also worked for Research Institute of Inorganic Chemistry (UniCRE) Ústí nad Labem. His main research areas are Biofuels, Pyrolysis Bio-oil Characterization and Petroleomics. Martin Staš is author or co-author of about ten papers published in impact journals and author or co-author of about ten other papers published in peer-reviewed journals or conference proceedings.

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Berta Cumbane et al., J Bioremediat Biodegrad 2018, Volume 9
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Understanding the potential of energy crops in heavy metals contaminated soils

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Statement of the Problem: The increasing demand for biomass for the production of bioenergy is generating land-use conflicts which might be avoided through the establishment of dedicated energy crops on marginal land, e.g. heavy-metal contaminated land. Indeed, heavy metals contaminated soils might cause marginality of soils through the degradation of their quality, inducing the reduction of crop yields and the quality of agricultural products, desertification, and the loss of ecosystem services. But assessment of bioenergy from marginal land should take into account constraining factors, such as productivity and biomass quality. Therefore, the aim of this work was to study the effects of soils contaminated with heavy metals on growth and productivity of kenaf, a fiber crop with potential to be used as a feedstock for bioenergy and biomaterials. Methodology & Theoretical Orientation: The effects of different heavy metals (Cd, Cu, Pb and Zn) on growth, productivity and biomass quality of kenaf was evaluated in a pot essay. Plants were tested under different levels of contamination: no contamination (0), low level of contamination (L) and high level of contamination (H). The low levels of contamination tested were chosen based on the Portuguese Decree Law 276/2009 that indicates limit values for concentrations of heavy metals in soil (Cd: 4 mg/kg, Cu: 300 mg/kg, Pb: 450 mg/kg, Zn: 450 mg/kg). The high level of contamination was twice this limit values. Findings: yields were not significantly affected by contamination. Yet, biomass from contaminated pots showed higher ash content and heavy metals content which can be detrimental for its valorization. Conclusion & Significance: Overall, kenaf showed high tolerance to soil contamination and biomass can be used for bioenergy and biomaterials although its quality may hinder its valorization options.

Biography

I have a degree in Agronomy and a master's degree in Natural Resource Management. As an employee of the University of Zambezi, in recent years, in addition to coordinating the research and extension sector in the Tete delegation, I participated in the elaboration of projects for the sustainable management of natural resources and agricultural production to improve the problems of child malnutrition in some regions of Mozambique. At this moment I am coordinator of the project to create the Laboratory of Geoprocessing and laboratory evaluation and promotion of environmental health, and as a doctoral student in Bioenergy, I am evaluating the phytoremediation potential of contaminated soils using energy crops.

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Notes:

Irene Malpartida et al., J Bioremediat Biodegrad 2018, Volume 9
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Mechanochemistry for a smart and sustainable biodiesel production under heterogeneous catalysis

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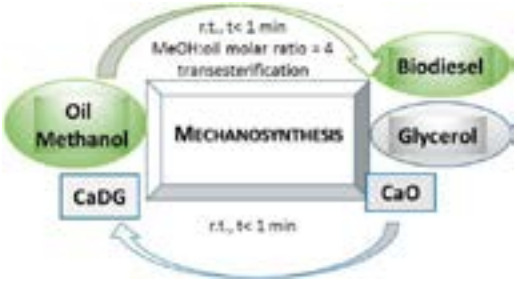
Fatty acid methyl esters (FAME) produced from vegetable oil by transesterification, labeled as "Biodiesel", is industrially accomplished in the presence of a homogeneous basic catalyst, such as alkali hydroxide or methoxide dissolved in methanol. This process requires a large excess of methanol (methanol:oil molar ratio> 6), temperature around 60 °C and 1-2 h of reaction [1]. However, this process suffers from important drawbacks: low FFA and water tolerance, generation of process wastewater, etc. To overcome them, different approaches have been proposed: such as the use of heterogeneous catalysis, CO2 under supercritical conditions or enzymes; coupled to microwave and ultrasonics systems as an alternative to conventional heating [2-3]. Among all the researches, heterogeneous catalysts show potential in the transesterification reaction. Unlike homogeneous catalysts, heterogeneous ones are environmentally benign and can be reused and regenerated. Nevertheless, higher catalyst loading and alcohol:oil molar ratio are required for biodiesel production in the presence of solid catalysts [4].

Methodology & Results: A new mechanochemical reactor is used for the transesterification reaction to promotes the reactants mixing, minimizing mass transfer limitations associated to the inmiscibility of reactants. This solution allows to reduce the methanol need to an amount close to the stoichiometry (methanol:oil molar ratio= 4:1), and at room temperature after less than one minute, more than 90 wt% FAME is reached [5].

Findings: Glycerol, obtained as by-product in the transesterification reaction is used to prepare calcium diglyceroxide by mechanosynthesis, and is used as heterogeneous catalyst. A new and more efficient mechanochemical synthesis of FAME is proposed, with shorter reaction and lower temperature [6], compared to other synthesis proposed in literature [7].

Significance: A new, smart and efficient process for biodiesel production was developed, without waste generation (no water, nearly no excess of methanol), with valorization of glycerol for catalyst synthesis, under very low energy consumption conditions.



Recent Publications

1. B. Freedman, E.H. Pryde, T.L. Mounts, Variables affecting the yield of fatty esters from transesterified vegetable oil, JAOCS 61 (1984) 1638–1643.
2. Juan Miguel Rubio-Caballero, Jose Santamarıa-Gonzalez, Josefa Merida-Robles, Ramon Moreno-Tost, Antonio Jimenez-Lopez, Pedro Maireles-Torres, Applied Catalysis B: Environmental 91 (2009) 339–346.
3. Ana C. Alba-Rubio, Jose Santamarıa-Gonzalez, Josefa M. Me rida-Robles, Ramon Moreno-Tost, David Martın-Alonso, Antonio Jimenez-Lopez, Pedro Maireles-Torres, Catalysis Today 149 (2010) 281–287
4. Ferenc E. Kiss, Milenko Jovanovi, Goran C. Bošković, Fuel Processing Technology 91 (2010) 1316–1320
5. Patent new biodiesel process - WO2018002559: Method for producing fatty acid esters and glycerol at low temperature.

Biography

Irene Malpartida has her expertise in heterogeneous catalysis and biodiesel production for more than 15 years. She has worked in design, processing and evaluation of novel catalysts and processes for applications in the automobile industrial market to achieve the future European Standards for the air quality; Hydrogen production; oxidation of HCs and Biodiesel production. She develops the reactivity Set-up to work in real conditions and novelty work conditions to join fundamental research with the needs of industrial partners as Renault, PSA, Ford. Nowadays, she joins a research of valorization of Biomass developing sustainable industrial production of biofuels, biogas and other products from microalgae and residual oils in collaboration with Dr. Pedro Maireles (University of Málaga) and DEASYL S.A. DEASYL is a Swiss company based in Geneva; it is an international supplier of technologies and catalysts for petrochemical industry. Our mission is to provide innovative solutions to produce eco-responsible green biodiesel.

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Notes:

Mirit K et al., J Bioremediat Biodegrad 2018, Volume 9
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Development of Biodiesel Production from Brown Grease

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The dramatic increase in oil prices, in spite of transient decreases, and global climate changes, affected by a rise in the atmospheric CO_2 concentration, have led to a need in alternative energy sources. Reducing dependence on fossil fuels could decrease concerns about energy security. For these reasons, a quest for sustainable and renewable biofuels has been gaining momentum in recent years, and bioenergy in general and renewable biofuels in particular are attracting increasing attention as a part of a trend to develop a sustainable and environmentally friendly economy. The present study is focused on development of a scheme for continuous biodiesel production from cooking oil waste - brown grease. This scheme will enable to solve two problems: energetic and environmental. Brown grease has high free fatty acid content and therefore can serve as a potential feedstock for biodiesel production. First, a protocol for separation of a fat layer from brown grease wastes was elaborated, and then conditions for an effective esterification reaction were chosen when heating was replaced by an ultrasonic activation. At each experimental stage samples were tested by HPLC. The results show that efficient separation of the fat layer from brown grease can be obtained under heating the wastes at 60°C for 15 min and following centrifugation at RCF 3,750 g for 5 minutes. The ultrasonic activation is expecting to serve as a basis for development of an innovative and efficient and biodiesel production in a continuous regime.

Recent Publications

1. Barbosa, S.L., Dabdoub, M.J., Hurtado, G.R., Klein, S.I., Baroni, A.C.M., Cunha, C., 2006. Solvent Free Esterification Reactions using Lewis Acids in Solid Phase Catalysis. Appl. Catal. A Gen. 313, 146–150.
2. Cintas, P., Mantegna, S., Gaudino, E.C., Cravotto, G., 2010. A New Pilot Flow Reactor for High-Intensity Ultrasound Irradiation. Application to the Synthesis of Biodiesel. Ultrason. Sonochem. 17, 985–989.
3. Pittman, J.K., Dean, A.P., Osundeko, O., 2011. The Potential of Sustainable Algal Biofuel Production Using Wastewater Resources. Bioresour. Technol. 102, 17–25.
4. Salamatinia, B., Abdullah, A.Z., Bhatia, S., 2012. Quality Evaluation of Biodiesel Produced through Ultrasound-Assisted Heterogeneous Catalytic System. Fuel Process. Technol. 97, 1–8.
5. Wirasnita, R., Hadibarata, T., Novelina, Y.M., Yusoff, A.R.M., Yusop, Z., 2013. A modified methylation method to determine fatty acid content by gas chromatography. Bull. Korean Chem. Soc. 34, 3239–3242.

Biography

Mirit has completed her M.Sc. at the age of 32 years from Ariel University, Ariel University, Israel. She started her Ph.D. in the 2016. She is on her second year as Ph.D. student. her research under the direction of Prof. Marina Nisnevitch, head of the Department of Chemical Engineering and Faina Nakunchani Senior Staff, is devoted to the innovative development of continuous production of biodiesel by chemical reactions (esterification and transformation with a solid heterogeneous catalyst or dissolved gaseous catalyst in liquid phase with its separation at the exit from the reactor and its recycling for reuse).

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Notes:

JOINT EVENT

12th World Congress on **Biofuels and Bioenergy**

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13th Global Summit and Expo on **Biomass and Bioenergy**

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e-Posters

S.Manrique et al., J Bioremediat Biodegrad 2018, Volume 9
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Is the solar radiation a comparative advantage for biomass production in northern Argentina?

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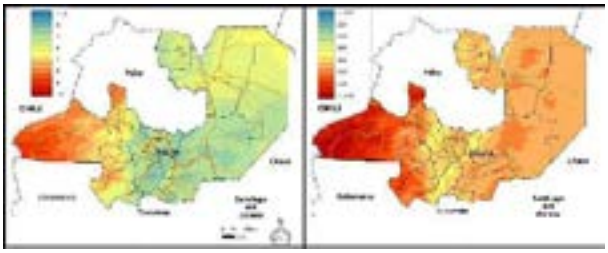
Microalgae have been recognized as a resource of great interest worldwide, due to the ability to store useful chemical compounds and pigments of high industrial value in their biomass. They have regained their prominence in recent years when the production of liquid biofuels from food crops began to generate debates about the socio-environmental impacts. The photosynthetic microalgae have high efficiency and rapid growth rate, flexibility to grow in any liquid medium including effluents, higher productivity compared to conventional crops and without dependence on fertile land. These qualities make them a promising alternative for the global energy supply. The solar radiation is the factor that defines the maximum biomass production capacity of the different species. Northern Argentina, one of the 7 regions with the highest level of solar radiation (Fig.1), provides the optimal conditions for algal growth, although this advantage has not yet been sufficiently exploited. Our group has focused on performing laboratory experiments with the *Scenesdesmus quadricauda,* scaling its culture and identifying management guidelines. In the lab up to a 20-liter scale, a favorable growth response has been observed at room temperature, both in the cold and warm seasons, with a growth cycle of 20 days. However, it was interesting to explore the behavior of the sp in outdoor ponds, observing whether solar radiation constituted a comparative advantage for its growth. This system is one of the most profitable, since it can be used for the treatment of wastewater from different sources with high organic load, reducing costs due to nutritional requirements of the microalgae. Added benefits for energy use could be evaluated later. Said system is planned to use as a complementary system for the sewage treatment plant in the city and therefore, the information obtained here will allow future planning.



Biography

S.Manrique is an Assistant Investigator CONICET. Lugar of trabajo: INENCO (Instituto de Investigaciones en Energía No Convencional) - CONICET y Universidad Nacional de Salta, Argentina.

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Notes:

Nancy Quaranta, J Bioremediat Biodegrad 2018, Volume 9
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Copper biosorption: Influence of biomass particle size

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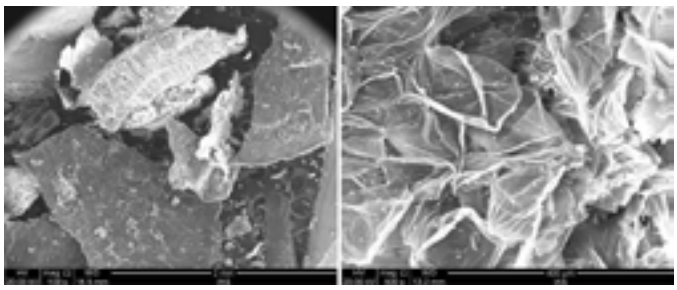
The heavy metals found in wastewater discharges generate serious environmental and health concerns. In recent years, there have been numerous studies based on the removal of heavy metal ions from aqueous solutions using lignocellulosic materials, which are capable of adsorbing various pollutants at low concentrations. The biomass under study in this work, which is used as a biosorbent of heavy metals, are peanut shells. The present work is oriented towards the study of the influence of biomass particle size on the copper adsorption process. For this purpose, the peanut shells were ground, separated in four different ranges of particle sizes (<1000 m, 1000-250 m, 250-88 m, 88-44 m). This biomass was analyzed by various techniques to determine its physicochemical and environmental characteristics: SEM-EDS, XRD, DTA-TGA, FTIR, pH, ecotoxicity, SBET, among others. Adsorption tests were carried out in batch, placing 100 ml of solution of known Cu++ concentration in contact with 5 g of biomass and shake for 2 hours at 180 rpm. The obtained dispersion was filtered and the concentration of the Cu++ ion in the solution was measured. The results obtained as a percentage of copper removal were 20.8 for the <1000 m size, 17.6 for the 1000-250 m size, 41.5 for 250-88 m size and 33.9 for 88-44 m size. It can be seen that the biosorption processes proved to be much more efficient for particle sizes less than 250 m. These results are related to the information obtained by the characterization of the BET surface of the samples. The figure 1 shows the SEM images of the peanut shells used, and the fibrous structure of this material.



Recent Publications

1. I. Morosanu, C. Teodosiu, C. Paduraru, L. Tofan (2017) Biosorption of lead ions from aqueous effluents by rapeseed biomass, New Biotechnology, 39 [A] 110-124.
2. L. Djemmoe, T. Njanja, M. Deussi, D. Tonle (2016) Assessment of copper (II) biosorption from aqueous solution by agricultural and industrial residues, Comptes Rendus Chimie, 19 [7] 841-849.
3. N. Quaranta, M. Caligaris, G. Pelozo, A. Césari, A. Cristóbal, (2018) Use of wastes from the peanut industry in the manufacture of building materials. Int. J. Sus. Dev. Plann. 13 [4] 662-670.

Biography

Dr. Nancy Quaranta obtained her Ph.D. in Chemistry at the National University of South (UNS-Argentina). She is a researcher of the Scientific Research Commission of Buenos Aires Province. She is the head of Environmental Studies Group and Materials Program Coordinator at the National Technological University. Her current research fields are materials and environmental sciences. She is author of numerous publications and presentations at international congresses. In the last years, her work has been oriented to the study and valorisation of industrial wastes, in particular residual biomasses of the agroindustry.

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JOINT EVENT

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Accepted Abstracts

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Above-ground bole carbon stock estimation using forest inventory and remote sensing data for secondary forest ecosystem in Ibadan, Nigeria

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Secondary forest ecosystem contributes to global climate change mitigation through carbon sequestration. Above-ground bole biomass (AGBB) is the major component for monitoring and estimating carbon stocks (CS) and fluxes in tropical forests. Integrating remote sensing (RS) with forest inventory (FI) techniques had also been reported to provide accurate estimation of above ground bole carbon stock (AGBCS). However, information on AGBCS for the International Institute of Tropical Agriculture (IITA), which hosts relics of the undisturbed secondary forest ecosystem in south-western Nigeria, has not been documented. Therefore, AGBCS of the secondary forest ecosystem was estimated using remote sensing and forest inventory techniques. Forest inventory and remote sensing data were used for this study. One hundred and forty plots of 50 m x 50 m were laid in IITA secondary forest using systematic sampling technique at 10% sampling intensity. Trees in each plot were enumerated and identified to species level. The total height (TH) and diameter at breast height (DBH) of trees ≥10 cm were measured to determine tree volume (TV). Sixty wood core samples were randomly collected from dominant trees species at breast height for wood density (WD) estimation. The TV and WD were used to determine AGBB, which were converted to CS using standard forest inventory method. Pleiades satellite imagery was acquired using RS technique and spectral data for each sample plot extracted. The spectral indices used for AGBB estimation were: normalized difference vegetation index (NDVI), difference vegetation index (DVI), infrared percentage vegetation index (IPVI), optimized soil adjusted vegetation index (OSAVI) and renormalized difference vegetation index (RDVI). The RS data were integrated with FI data to develop regression equations for the prediction of AGBB from where the total CS estimate was obtained. Data were analysed using descriptive statistics and regression analysis at α¬¬0.05. A total of 9,985 individual trees comprising 121 tree species and 30 families were recorded. The highest and least frequency of species recorded were *Funtumia elastica* (61/ha) and *Cordia alliodora* (1/ha) respectively. The TH and DBH ranged from 4.70 to 39.30 m and 10.76 to 74.50 cm, respectively, while TV ranged from 129.57 to 167,186 m^3/ha. The WD of tree species ranged from 0.23 to 0.89 kg/cm^3. The AGBB and CS ranged from 101.06 to 881,834.92 kg/ha and 50.53 to 440,917.46 kg/ha, respectively. The DVI had the highest AGBB value which ranged from 187 to 15,577 kg/ha, followed by IPVI, RDVI and OSAVI which ranged from 7,561 to 12,324 kg/ha, 64.0591 to 133.178 kg/ha, 0.0134 to 0.5621 kg/ha, respectively, while NDVI had the least values which ranged from -0.01 to 0.48 kg/ha. The best AGBB estimation model was AGBB = *exp* (3,496.61 +0.99x(RDVI) $^{1/2}$); (Coefficient of determination = 0.93, root mean square error = 31.39, Bayesian information = 2129.34). The total carbon stock ranged from 11,035 to 18,774 kg/ha. Model with renormalized difference vegetation index was most suitable among other indices for estimating above-ground bole carbon stock when integrated with forest inventory data.

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Notes:

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In situ biodiesel production via reactive extraction of mixed crop oil

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The production of biodiesel from crop oils under application of homogenous and heterogeneous based catalyzed transesterification is commonly well known. The feedstock of biodiesel (mix of *Ricinus communis L.* and *Jatropha curcas L.* oil) is produced through either processes chemical or mechanical extraction. This method represents both the oil extraction and chemical reaction take place separately. In this study, the process of oil extraction and biodiesel production proceed in situ into a transesterification reactor which it is termed as a reactive extraction process. The ratios of solvent (n-hexane) volume and reactant (ethanol) mole are taken into account for optimizing the production of biodiesel. The diluted potassium hydroxide in amount of 1.0% w/w is applied as the catalyst. The results show that the reactive extraction method is suitable for biodiesel production due to it is able to obtain the maximum yield of biodiesel, around 79.8%. The characterization of biodiesel is performed using standard ASTM D 6751. As the main issue of this study is biodiesel production for applying in the climate area. The composition of hydrocarbon compounds of biodiesel must be analyzed via gas chromatography to confirm the biodiesel quality meets the requisite for cold flow properties. The inferior cold flow properties may cause the fuel line problem, such as the formation of crystal particle which can block the fuel flow under low temperature region.

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Developing an advanced biofuels industry in California: the alternative and renewable fuel and vehicle technology program

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In September 2016, California put into law statewide goals to reduce greenhouse gas (GHG) emissions including 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050. To help achieve these goals California has a number of policy initiatives including the Short-Lived Climate Pollutant (SLCP) Reduction Strategy and the Low Carbon Fuel Standard (LCFS). The SLCP Reduction Strategy identifies a range of options for accelerating short-lived climate emission reductions including regulation, incentives, and other market supporting activities. The SLCP Reduction Strategy was approved in March 2017 with implementation beginning in January 2018. The LCFS which has been in place since 2009 is designed to encourage the use of cleaner low-carbon fuels by creating market incentives for near-term GHG reductions, and has a goal of reducing the overall carbon intensity of fuel within the transportation sector 10% by 2020. With California's transportation sector accounting for 37% of the State's overall GHG emissions, achieving California's climate goals will require significant technological and market changes within the transportation sector. To help transform California's transportation market, the California Energy Commission administers the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) which provides up to $100 million annually to develop and deploy a portfolio of alternative fuel and advanced vehicle technologies, including the production of biofuels. Biofuels including gasoline substitutes, diesel substitutes, and biomethane are anticipated to provide immediate and long-term opportunities to reduce both GHG emissions and petroleum use. Through the ARFVTP the Energy Commission has awarded $167 million to 59 biofuel projects, ranging from bench-scale to commercial production, with the goal of expanding the production of low-carbon, economically competitive biofuels from waste-based and renewable feedstocks in California.

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12th World Congress on **Biofuels and Bioenergy**

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September 04-06, 2018 | Zurich, Switzerland

The energy potential of biomass Jerusalem artichoke in the moderate climate condition

Barbara Sawicka
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Renewable energy sources (RES) play an increasingly important role in the energy balance of Europe. One of the most valuable energy plants is Jerusalem artichoke, characterized by low climatic and soil requirements, high production potential and multi-functionality. Due to the rich chemical composition, a large ability to bind solar energy and convert it into an organic substance Jerusalem artichoke can partially or completely replace the deficient energetic materials, as well as allow to widen the range of products produced [1-3, 4-5]. Biomass from the Jerusalem artichoke plantation can be used for the production of electricity or heat, as well as for the production of liquid or gas fuel. Based on the existing Jerusalem artichoke plantations, it is possible to create local, distributed power centers located in small towns - instead of the municipal heating based mainly on hard coal. The creation of a local biomass system (electricity + heat) is very economically efficient (90% efficiency), fully ecological and activating rural areas through the creation of new jobs, full use of land and the circulation of capital in the local system, which creates a "flywheel" local economy. [1,3]. When using biomass on a large scale in local energy centers, the most justified form, for economic reasons, should be unprocessed biomass, transported at of the short distances (50 km). The profitability of its cultivation and the growing demand for propagating material, in the context of biofuels, make this species more and more popular. The research was carried out in 2015-2017 in Lublin Province on fawn soil, slightly acidic. The experiment was set up using 3 random repetition blocks. The research subjects were 3 cultivars: Albik, Rubik and Violet de Rennes. The above ground was harvested in autumn and the tubers in early spring. After harvest, tubers and ground weights were determined and their dry matter. The calorific value of the material under test was calculated on the basis of the combustion heat, humidity, hydrogen and ash content in the analytical state (moisture content of the material after preparation of the sample for analysis) and in the working state (humidity of the material as finished fuel) and dry ash. The heat of biomass combustion was followed by Sawicka [1]. The results of the study were statistically calculated using variance analysis (ANOVA).

Conclusions: Jerusalem artichoke is suitable for use in biorefineries due to very high biomass production and low soil, climatic and cultivation requirements. Tubers of this species can be used to produce methane fermentation or bioethanol; the aboveground part can be used for the production of biomethane as well as in the process of direct combustion or for the production of briquettes and pellets. The cultivars Albik and Violet de Rennes were the most useful for energy purposes from the tested cultivars. An important advantage of tuberous sunflower is the possibility of self-renewal.

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Notes:

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Targeted Modulation of Brassica Seed Triglycerides Pathway to Produce Plant Oil for Direct Use as Biodiesel

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Energy crises along with environmental concerns are driving researchers to develop viable alternative fuels from renewable resources. The use of *Brassica juncea* oil as an alternative fuel suffers from problems such as high viscosity, low volatility and poor cold temperature properties. The seed of *Euonymus alatus* produces low viscosity oil having unusual triacylglycerol (TAGs) called acetyl triacylglycerol (acTAGs) where the sn-3 position is esterified with acetate instead of a long chain fatty acid. The enzyme *Euonymous alatus* diacylglycerol acetyltransfrase (EaDacT) present in these plants is an acetyltransferase that catalyzes the transfer of an acetyl group from acetyl-CoA to diacylglycerol (DAG) to produce acTAG. In order to reduce the viscosity of *Brassica juncea* oil by synthesizing acTAG, we have developed an efficient and simple agrobacterium mediated floral dip transformation method to generate transgenic *Brassica juncea* plants. A binary vector containing the EaDacT gene under the transcriptional control of a glycinin promoter and with a basta selection marker was transformed into *Agrobacterium tumefaciens* strain GV-3101 through electroporation. Basta is a herbicide which is used as a selection marker to allow us to conveniently screen very young transgenic plants from a large number of untransformed plants. The basta resistant putative transgenic plants were further confirmed by PCR. Biochemical analyses of the transgenic B. juncea seed revealed modified fatty acids profile having no acetyl TAGs. Alternative strategy is in process to silence genes encoding enzymes DGAT/PDAT along with overexpression of *EaDAcT,* that will hopefully produce acetyl TAGs.

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Modelling systems for the Anaerobic Digestion of Abattoir and Piggery Effluent and subsequent generation of methane

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Anaerobic systems are advantageous for the treatment of industrial effluent for multiple reasons, but there is limited software available to monitor and predict the performance. Software, such as 'BioWin' can be used to estimate the percentage of gas methane generated, as well as the reduction in Chemical Oxygen Demand (COD), Total Suspended Solids (TSS) and other influent parameters. This research has then been applied to two unique sites and scenarios in Australia to test the accuracy and validity of this modelling procedure. One site is operated by a large regional water board, with two anaerobic lagoons used to treat high temperature effluent from a red meat abattoir. The other site features a large covered lagoon which is used to treat effluent from piggeries, which is much lower in temperature, but less contaminated by fats, oils, and greases (FOG's). By modelling these scenarios, several conclusions can be made about the accuracy of BioWin modelling for anaerobic digestion and methane generation. Firstly, there are issues with the estimation of the TSS and this prediction often varies significantly from the observed site data. This difference is likely because BioWin is designed to model municipal effluent, as opposed to industrial abattoir effluent. Despite this limitation, the COD estimation and HRT (Hydraulic Retention Time) are very accurate. Additionally, the piggery effluent is more accurately modelled that the red meat effluent, as there are less FOG's in the effluent. A literature review in this field illustrated that red meat effluent presents problems, since a scum layer of FOG's form on the surface of the lagoon, which prevents full COD degradation and hence reduces the biogas yield. It should be noted that the climatic conditions have a significant impact on the efficiency of treatment, and the high temperature and low rainfall of the sites in Australia present ideal conditions for maximal methane generation. Hence there is a potential requirement for anaerobic lagoon/tank heating within Europe. Despite this limiting factor the use of anaerobic digestion technology is widespread in countries like Germany.

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Research on Improvement of Power Quality Problem in Photovoltaic Grid-connected System

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With the exhaustion of fossil oil and environment pollution, the development of renewable clean energy pays more attention. Solar energy becomes the main development direction in the world energy field because of its inexhaustible and non-pollution. At present, PV generation is widely used in power system, which causes the change of structure and control mode of grid. PV itself intermittent output characteristic brings the traditional power grid disturbances as well as power quality problems. The research of photovoltaic grid-connected system power quality problems is an important prerequisite to ensure safe and reliable economic operation of power system. Based on the research of improvement to PV system power quality, this paper analyzes the impact of output filters and control strategy of PV grid to the power quality. And this paper proposes an improved filter, which can effectively attenuate harmonic components around switching frequency of grid current. Combining the improved filter and control strategy, the injected current quality of grid is significantly improved and the performance of PV system well improved also. This paper introduces the structure and characteristics of photovoltaic power grid system ,and based on the existing output LCL filter, the paper puts forward a new LCL-LC filter by increasing a series LC branch to the LCL filer and gives a simple way to design the new LCL-LC filter. As to the LCL-LC filter, two control schemes are proposed based on capacitive current feedback active damping dual loop control strategy. The theoretical study and simulation result show that LCL-LC filter can well reject the switching frequency harmonics. This paper does the simulations of output filter and control strategy using Matlab/Simulink simulation environment, and compares the effect and structure with LCL filter. The results of simulation show that the improved methods can effectively improve power quality of PV grid-connected system.

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Analytical design for CL-CSP system and review of its working for a 30 kWt CL-CSP system at RGPV, Bhopal, India

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Solar photo voltaic (PV) technology has been used for long to generate power from the sun. But its use has remained limited because of its low efficiency and other constraints. Now, concentrating solar power (CSP) is emerging as a viable alternative. Unlike PV cells which are flat, CSP involves the use of parabolic mirrors in long troughs, which concentrate solar irradiation into a centrally placed special tube which absorbs radiation. The heat generated into the tube is then used to produce electricity. To contribute in target of Government of India, RGPV started a Indo-Japanese collaborative R&D project on a path breaking and innovative solar thermal technology with the collaboration with Prof.Y.Tamaura, Emeritus Professor, Tokyo institute of technology Japan. This Technology is known as Cross Linear-Concentrated Solar Power (CL-CSP).This technology is amalgamation of two exiting solar thermal technology i.e. Linear Fresnel and Solar Tower. CL-CSP has virtues of both conventional Linear Fresnel and Tower technologies. In this innovative and breakthrough CL-CSP technology temperature of 600 ^{O}C will be achieved by concentrating solar to the receiver. The Heliostat use in this new technology is gyro type with E-W and N-S tracking facility, which is first time manufacture in world wide. The power consumption for operational of this tracking mechanism is very less. The heliostat is very cost effective with reflective efficiency of 95% and weight 90 kg with approx. 3.5 m^2 area as compare with conventional heliostat and air is being used as a heat transfer medium in the solar air receiver which can further can be utilized to generate steam. This Technology may be substitution of coal for existing Thermal Power Plants during the day Time. As the Thermal to Thermal Conversation efficiency is 80%. This can also replace Fossil Fuels in Factories/industries and use for Hybrid Technology for CSP Plants.

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Nitrogen-Doped 3D Hierarchically Porous Carbon Derived from Renewable Biomass for Energy Storage Application

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The development of renewable carbon sources for sustainable supercapacitor is of significance importance. Herein, the synthesis of three-dimensional N-doped carbons derived from lecithin via a simple route was reported. Hierarchical porous carbons with high surface area (up to 1803 $m^2 g^{-1}$) along with nitrogen-doping level (up to 9.2 wt. %) were successfully prepared by hydrothermal carbonization and a subsequent thermal annealing. The electrochemical performance of the carbon electrodes was examined with both two and three-electrode cell configurations in 1 M KOH and 1 M H_2SO_4 electrolytes. The as-prepared electrode features a large specific capacitance (285 F g^{-1} at 0.5 A g-1), high-rate capacitive behavior, and long-term cycling stability (8% loss after 20000 cycles). Furthermore, obtained electrode exhibits an energy density of 24.7 W h kg-1 at a power density of 500 W kg^{-1} in 1 M H_2SO_4. The excellent electrochemical performance of N-doped carbons is attributed to the unique hierarchical porous frameworks along with pseudocapacitive effect. This work opens up a new approach for preparation of hierarchical N-doped porous carbon materials with tailored properties for supercapacitor applications.

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Novel method for algal biomass dewatering and harvesting

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Algal biofuel has significant potential for reducing the US's dependence on fossil fuels while curbing greenhouse gas emissions. Despite these benefits, a scalable, sustainable, and commercially viable system has not yet been developed. The key barriers relate to the cost and energy intensity of algal feedstock production, mainly during biomass harvesting and dewatering. It has been estimated that harvesting and dewatering account for 30 to 50% of the cost of algal biomass production. Harvesting and dewatering equipment has also been estimated to comprise 90% of upfront cost for algal biomass production. Moreover, the most energy and carbon intensive processes in the existing algae-to-biofuel pathways are harvesting and dewatering, accounting up to 90% of the total energy requirements. To address these challenges, a thermal energy capture system is proposed for algal biomass harvesting and dewatering. The proposed technology is a fundamentally new approach and potentially transformative. It will utilize low-grade thermal energy in a flue gas stream, which is affordable and readily available at stationary sources such as power plants, for heating algal biomass in heat exchangers and subsequently dewatering in an evaporation tank. This paper will present the major findings from the research.

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Modelling Physical Vapor Deposited Nano-scaled Nickel Cermet Anodes for Fuel Cells Operating on Biomass

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Nickel-Gadolinium Doped Ceria (Ni-GDC) cermet anodic thin films were prepared on zirconia electrolyte supports by two distinct physical vapor deposition (PVD) processes, 1) pulsed laser deposition (PLD) 2) radio frequency (RF) sputtering. For PLD, the deposition was carried out at a target temperature range of 0°C~700°C. For RF sputtering, the target temperature was kept constant at room temperature of 25°C, however the background sputtering gas was Ar:O2/80:20. The fuel cell configuration was completed by screen printing of lanthanum strontium manganite (LSM/YSZ) cathodes on the other side of electrolyte supports. Peak performance comparison of these cells was measured under hydrogen (H_2) fuel source at an intermediate temperature range of 600°C ~ 800°C by voltage-current-power curves. The resistances of various cell components were observed by nyquist plots. Initial results showed that anode thin films made at increased target temperature, pressure, and high deposition power, performed better than the low powered ones, for a specific Ar or O_2 pressure. Interestingly, however, anodes made at the highest power and the highest pressure, were not the ones that showed the maximum power output at an intermediate oxide fuel cell temperature range. These high performance anodes were then tested under the product fuel of CO_2 electro-reduced via biomass carbon obtained from industrial waste(IWC). IWC fuel performance matched up to the H2 fuel performance in terms of peak power density and longevity, with an added lower fuel cost advantage. High resolution transmission and scanning electron microscope 2D images were utilized to understand the three phased (Ni, Ce, Pores) of the cermet anode made by both PVD processes. The electrochemical model was used to simulate the kinetics of nanostructured porous thin film cermet anodes. Experimental and simulation results were coherent with each other, especially for IWC operated fuel cells working at the upper range of intermediate SOFCs.

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Energetic use of residues from rice parboiling industries in southern Brazil: biogas and hydrogen-syngas generation

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Brazil is one of the world's largest rice producers with trends for the growth of this sector. During the processing of the grain, high amounts of husk are generated, corresponding to 22% of its weight. On the other hand, in the process of parboiling, in turn, the final result is considerable volumes of effluent rich in organic matter. Thereby, this study demonstrates an energetic, economic and environmental way the possibilities of using these residues for power generation in the southern Brazilian rice parboiling industries. Two scenarios are presented: the first, with the use of biogas and the second, with the use of hydrogen-rich syngas. A case study was made in one of these industries, where it was discussed in detail the energy potential coming from systems operating with a CHP genset, using hydrogen-rich syngas from the rice husks and the biogas from the anaerobic treatment of the effluents. The results have shown that it is possible to produce more than 2,17Eþ04 MWh of electricity just considering the use of the biogas generated. On the other hand, the use of syngas generates enough thermal energy to operate the entire industrial process, with a surplus of 53,3% in MWh/year.

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Comparative study of effects of electrode materials and catholyte on simultaneous generation of bioelectricity and waste water treatment

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Improvement of the parameters which limit the harvest of energy in microbial fuel cell (MFC) is paramount to increase its output and promote commercial application of the technology. Six dual chamber MFCs with either potassium permanganate or potassium ferricyanide as electron acceptor and various combinations of carbon and copper rods as electrodes produced maximum open circuit voltage (OCV) of 0.97V, 1.23V, 1.34V, 0.75V, 1.03V and 0.63V. The power density (at Rext =1000Ω), which increased with decreasing external resistance until 200Ω beyond which it decreased, peaked at 79.27mW/m^2 (105.7mA/m^2), 156.32mW/m^2 (148.4mA/m^2), 92.29mW/m^2 (114.0mA/m^2), 60.94mW/m^2 (92.6mA/m2), 39.94mW/m^2 (75.0mA/m^2) and 14.21mW/m^2 (44.70mA/m^2) for the MFCs. Similarly, Coulombic efficiency (CE) were 69%, 84%, 74%, 76%,72% and 5.10%, while COD removal were 65%, 51%, 47%, 83%, 48% and 49%. Above results indicated that potassium permanganate outperformed potassium ferricyanide, while use of carbon as both electrodes was better than other blends copper and/or carbon used in the study. *Lactobacillus spp., Corynebacterium spp., Streptococcus spp., Proteus mirabilis, Enterobacter spp., Escherichia coli, Pseudomonas spp., Bacillus spp., Aeromonas spp., Micrococcus lyteus, Corynebacterium spp., Cladosporium, Aspergillus versicolour, Candida albicans, A. flavus, Aspergillus nidulans, Trichoderma spp.* and *Aspergillus fumigatus* were microorganisms isolated from the piggery wastewater. Further studies using cheaper, more sustainable materials with better effects on the setup are necessary.

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Combustion of olive cake in a bubbling fluidized bed combustor: Control methods for agglomeration

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In this study, agglomeration problem for the combustion of olive cake was investigated in a laboratory scale bubbling fluidized bed combustion system of 100 mm inside diameter and 1800 mm height. Three control methods were used: co-combustion of olive cake with 50% by weight Turkish lignites (Tunçbilek lignite, Çan lignite), pre-combustion leaching of the olive cake and using limestone as bed material instead of silica-sand. Alkali metals in fuel ash can react with silica sand as a bed material in fluidized bed system so the formation of molten silicates at low temperature can occur. It seems that one of these two contents has to be removed from the system or the quantities should be reduced in order to prevent agglomeration. Within this scope, above-mentioned control methods have been examined. At the end of each test, bottom ash samples were subjected to XRF, XRD, SEM /EDS and EPMA analyses to determine elemental composition and phases of bottom ashes. Agglomerated particles were detected at the bed temperature of 850˚C for the combustion of olive cake. Therefore, control methods were carried out at the same bed temperature. Co-combustion of fuel mixtures at a bed temperature of 850°C were considered as reference tests where the possibility of the agglomeration problem is low. These co-combustion tests were re-conducted at 900˚C. Co-combustion tests were carried out without any problem of operation. For the mixture of lignites and olive cake, K was observed in the form of $KAlSiO_4$ in the bottom ash. In this case, the formation of potassium silicate was prevented and an agglomerated particle was not seen. Removal of alkaline contents in the olive cake by leaching prevents silicate formation. At the end of the tests, a noticeable decrease in the agglomeration rate was observed. Using limestone as a bed material, K was found in the form of Arcanite (K_2SO_4) in the bottom ash. The amount of agglomeration on the internal surface of the combustor decreased compared to the olive cake test.

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Pretreatment: A key process for development of second-generation biorefineries

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Lignocellulose can be used for sustainable production of different biofuels (e.g., bioethanol, biogas, and biobutanol), biochemicals (e.g., citric and lactic acids, fungal chitosan, carotene, and xanthan gum), animal feed (e.g., fish feed and cattle feed), and a number of other valuable products. However, lignocellulose is made in nature to resist against microbial and physical attacks. Thus, any biorefinery development based on the application of lignocellulose should deal with these recalcitrant properties of lignocellulose using a pretreatment prior to biological processing. Lignocellulose are non-food wastes, including industrial wastes (e.g., sawdust, food industry wastes, and paper mill discards), forestry wastes (i.e., hardwoods and softwoods), agricultural residues (e.g., straws, stovers, and non-food seeds), domestic wastes (e.g., kitchen wastes, sewage, garden wastes, and waste papers), and municipal solid wastes. Cellulose, hemicellulose, and lignin are the major constituents of lignocellulosic biomass. Different pretreatment processes, including physical, chemical, and biological treatments, have been presented. Among them, pretreatment with cellulose solvents, e.g., NaOH/urea, concentrated phosphoric acid, N-methylmorpholine-N-oxide, and different ionic liquids, are highly effective. After dissolution and regeneration, without major derivatization, the pretreated biomass can be subjected to microbial or enzymatic hydrolysis and converted. However, there are several challenges in these processes for industrial applications. The pretreatments efficiency is studied using a variety of analytical methods, including different imaging techniques, compositional analyses, measurement of crystallinity, degree of polymerization, enzyme adsorption/desorption, and enzyme accessibility. An introduction to lignocellulose properties, recent advances in different solvent pretreatments, and the related analysis will be presented.

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Synthesis and characterization of alumina-supported bimetallic oxide CuO-ZnO catalyst for transesterification of kapok seed oil (*Ceiba pentandra*)

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Statement of the Problem: At the present time, the researchers much attracted to developing renewable energy because the world's fossil oil reserves have decreased significantly. Biodiesel is one of the most promising alternative energies for substituting fossil fuels. However, the main obstacle faced at this time the cost of biodiesel production is too expensive, so the price of biodiesel can't compete against the price of diesel oil. There are two main causes, namely, first the production process using a homogeneous catalyst that has many weaknesses. The second, the raw material uses palm oil, which in fact besides the expensive price, also compete with the food industry. The use of the heterogeneous catalyst for substitution of the homogeneous catalyst and using low-cost oil as feedstock is a promising strategy for biodiesel production. Therefore, this study was to focus on developing of alumina supported CuO-ZnO heterogeneous catalyst (ZCA) for transesterification of kapok seed oil. The aim of this study is to synthesize and characterization of CuO-ZnO-/γ-Al_2O_3 (ZCA) catalyst.

Methodology & Theoretical Orientation: The synthesizing of the catalyst was done using a sol-gel method. Whereas, the characterizations of the synthesized catalyst were done by several methods which include: x-ray diffraction (X-RD), scanning electron microscopy (SEM) and Brunauer, Emmett and Teller (BET), respectively. The activity test of catalyst was done by introducing the CZA catalyst on transesterification of kapok seed oil with methanol in glass type batch reactor.

Findings: CuO- ZnO-/γ-Al_2O_3 (ZCA) was successfully synthesized and it was quite good and potential using as heterogeneous catalyst for transesterification of kapok seed oil.

Conclusion & Significance: The heterogeneous catalyst proved as an effective and friendly process for substituting a homogeneous catalyst for production of biodiesel from low grade or low cost oil.

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Biomass energy in Nepal: A conspectus

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Biomass are the prominent global source of energy, especially in many developing countries. Biomass includes firewood, agricultural and animal waste which has become the primary energy source in Nepal. Therefore, it is considered to be the alternative energy source at present and probably in the future as well. It is estimated that forest covers around 9.2 million hectare land area in Nepal and 3.4 million hectares of land is considered to be fuel collecting area. The total fuel wood consumption is around 12 million tons. According to 2015 data, Nepal consumes 78% biomass, 3% modern renewable, 12% petroleum products, 4% coal and 3% electricity. In terms of hydroelectricity, it is estimated that Nepal has the potentiality of producing 83,000 MW. But, due to the lack of feasibilities and other resources only 757 MW electricity has been produced. Due to the lack of money, expertise and social political constraints, the other sources of alternative energy like wind, solar and biomass are still limited. To go through the bird's eye view, only biogas projects have been successfully established and implemented. The reasons behind it are price hike in petroleum products and environmental degradation in the country due to greenhouse gas effects. The Nepalese government has also given more priority to biogas energy option, especially in the rural areas where most of the people are farmers and rear cattle. Currently in Nepal, some public vehicles run by bioethanol. This has also helped to reduce the fossil fuel import to some extent. At present, different collaborative researches are being carried out in biomass energy technology in Nepal.

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Industrial biorefinery of lignocellulose for bioethanol and biomaterials in China

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An environmentally friendly industrial biorefinery of the lignocelluloses such as corn cob and other cereal straws for production of bioethanol and biomaterials by a combination of hydrothermal pre-treatment and alkali post-treatment will be reported. 30 thousand tonnes of bioethanol, 12 thousand tonnes of oligosaccharides and 10 thousand tonnes of xylitol with a purity of more than 97%, 300 hundred tonnes of arabinose with a purity of more than 98.5%, and 15 thousand tonnes of lignin with a purity of more than 94% have being produced from 200 thousands of corn cob per year at Shandong Longlive Bio-Technology Co., Ltd, China. The recovered lignin, which is a significant source of CO2 emissions if burned, was activated under alkaline conditions and then used to produce lignin-phenol-formaldehyde (LPF) adhesives with a yield of about 100 thousand tonnes per year for partially replacing the expensive phenols (50%) in the commercial production of biocomposite boards for construction. Finally, the cellulose-rich fraction, which has a large surface area and total pore volume, is enzymatically hydrolyzed and then fermented into bioethanol with a high conversion, in which 3 tonnes of the cellulose-rich fraction can produce one ton of bioethanol. These value-added hemicelluloses- and lignin-derived products have greatly improved the economy of both lignocellulose conversion and bioethanol production. Similar biorefinery of 200 thousand tonnes of maize stem and 200 thousand tonnes of sorghum stalk for bioethanol and multi-biomaterials production is under construction in China today.

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Estimation of concentration-independent rate-constant (CIRC) for esterification kinetics of biodiesel synthesis from high FFA containing low cost feed stocks

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The raw material accounts for 60–80% of the total cost of biodiesel fuel produced via transesterification of refined oil. The profitable biodiesel can be produced from low cost feed-stocks. But such feed-stocks generally contain large amounts of free fatty acids (FFA). A key challenge is cost-effective pretreatment of high FFA feed-stocks to reduce the FFA below the desired levels prior to the transesterification process. Kinetics of the esterification reaction cannot be computed unless the rate law and values of rate constant are known. Rate constants are determined usually by performing experiments at different reaction conditions. In this work, a novel method is proposed as shown in the Figure 1 for the estimation of rate constants for H_2SO_4-catalyzed esterification of FFA with methanol for the biodiesel synthesis from the low-cost feed-stocks. This method is based on the concept of concentration-independent rate-constant (CIRC) and equilibrium constant as a function of temperature only. The various steps involved in the method are shown in detail in the figure 2. Techniques of design of experiments (DOE) such as Taguchi method and full-factorial design are used to design the experiments and to perform statistical and regression analysis of the results using software MINITAB 15 to obtain mathematical models for the estimation of rate constants. Effects of catalyst loadings (0.5-2.0 wt %), temperature (40-60°C), and molar ratio (3-9) on the kinetics are studied. Mathematical models developed for the predictions of kinetics are statistically and kinetically tested through model adequacy check. Models are found to be suitable for kinetics predictions. The CIRCs are then estimated from the predicted kinetics of models. The estimated CIRCs are compared with the experimental values of CIRCs obtained from the validation experiments and most of them are found to be within ±10% deviation as shown in figure 3.

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Biomass Energy Production, Energy Imports and Economic Growth. Multivariate Panel Data Evidence for IEA-30 Countries

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Energy is considered a vital element that influences economic growth. The contemporary increase in worldwide population drives greater energy generation demand from conventional exhaustible resources. Energy generated from exhaustible resources endanger the environment and imperils economic development. However, switching to the production of renewable energies from naturally replenished resources addresses issues of global warming and climate change and further grants energy security. Also, country-based sustained economic growth is likely to trigger a surge in energy imports. Therefore, the aim of this current study is to investigate the nexus between total biomass energy production, energy imports and economic growth for International Energy Administration (IEA)-30 countries for the period of 2000-2015. Our panel fully modified and dynamic ordinary least squares regression shows a significant positive influence of total primary renewable energy production on economic growth. Thus, a percentage increase in primary renewable energy production increases Gross Domestic Product (GDP) per capita by 0.04%-0.05%. For our panel vector error correction model based causality nexus, we notice that in both the short and long-run, there exist unidirectional causality running from economic growth and energy imports to total biomass energy production which supports the conservation hypothesis. The findings indicate that economic growth and energy imports drive total biomass energy production. This study guides policymakers in formulating a conclusive energy and trade policies for sustainable economic growth.

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