

1. [Anaerobic treatment of palm oil mill effluent using combined high-rate anaerobic reactors](#)

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วารสาร: Bioresource Technology, Volume 141, August 2013, Pages 138–144

Abstract: Combined system of high-rate anaerobic reactors for treating palm oil mill effluent (POME) was developed and investigated in this study. The system composed of one common primary hybrid reactor which was shared by two different secondary filter reactors. An overall COD removal efficiency of 93.5% was achieved in both systems. The secondary reactors contributed not only in enhancing the COD removal efficiency, but also ensured the performance stability of the entire system. Biomass remained intact in the secondary reactor in contrast to the primary reactor in which occasional washout of biomass was observed. The pH of POME was adjusted at the beginning of the operation, as the process continued POME did not require the external pH adjustment as the pH was maintained in desired range. The biogas was produced up to 110 l/d with the yield of 0.171–0.269 l [CH₄]/g [COD removed] and 59.5–78.2% content of methane.

2. [Evaluation of the potential of 10 microalgal strains for biodiesel production](#)

ผู้แต่ง: Mingming Song, Haiyan Pei, Wenrong Hu, Guixia Ma

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Abstract: In this study, the potential of 10 algae species for biodiesel production were evaluated by determining their fatty acid profiles, biodiesel properties besides growth rate, biomass concentration and lipid productivity. Among seven strains with high growth and lipid accumulation properties, excluding *Kirchneriella lunaris* and *Lyngbya kuetzingii*, five species *Selenastrum capricornutum*, *Chlorella vulgaris*, *Scenedesmus obliquus*, *Phaeodactylum tricornutum* and *Isochrysis sphacrica* were finally selected for biodiesel production due to their possessing higher lipid productivity and favorable biodiesel properties. The best strain was *P. tricornutum*, with lipid content of 61.43 ± 0.95%, lipid productivity of 26.75 mg L⁻¹ d⁻¹, the favorable fatty acid profiles of C16–C18 (74.50%), C14:0 (11.68%) and C16:1 (22.34%) as well as suitable biodiesel properties of higher cetane number (55.10), lower iodine number (99.2 g_I/100 g) and relatively low cloud point (4.47 °C).

3. [Power generation by packed-bed air-cathode microbial fuel cells](#)

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วารสาร: Bioresource Technology, Volume 142, August 2013, Pages 109–114

Abstract: Catalysts and catalyst binders are significant portions of the cost of microbial fuel cell (MFC) cathodes. Many materials have been tested as aqueous cathodes, but air-cathodes are needed to avoid energy demands for water aeration. Packed-bed air-cathodes were constructed without expensive binders or diffusion layers using four inexpensive carbon-based materials. Cathodes made from activated carbon produced the largest maximum power density of 676 ± 93 mW/m², followed by semi-coke (376 ± 47 mW/m²), graphite (122 ± 14 mW/m²) and carbon felt (60 ± 43 mW/m²). Increasing the mass of activated

carbon and semi-coke from 5 to ≥ 15 g significantly reduced power generation because of a reduction in oxygen transfer due to a thicker water layer in the cathode (~ 3 or ~ 6 cm). These results indicate that a thin packed layer of activated carbon or semi-coke can be used to make inexpensive air-cathodes for MFCs.

4. ['Energy landscapes': Meeting energy demands and human aspirations](#)

ผู้แต่ง: Thomas Blaschke, Markus Biberacher, Sabine Gadocha, Ingrid Schardinger

วารสาร: Biomass and Bioenergy, Volume 55, August 2013, Pages 3–16

Abstract: Renewable energy will play a crucial role in the future society of the 21st century. The various renewable energy sources need to be balanced and their use carefully planned since they are characterized by high temporal and spatial variability that will pose challenges to maintaining a well balanced supply and to the stability of the grid. This article examines the ways that future 'energy landscapes' can be modelled in time and space. Biomass needs a great deal of space per unit of energy produced but it is an energy carrier that may be strategically useful in circumstances where other renewable energy carriers are likely to deliver less. A critical question considered in this article is whether a massive expansion in the use of biomass will allow us to construct future scenarios while repositioning the 'energy landscape' as an object of study. A second important issue is the utilization of heat from biomass energy plants. Biomass energy also has a larger spatial footprint than other carriers such as, for example, solar energy. This article seeks to provide a bridge between energy modelling and spatial planning while integrating research and techniques in energy modelling with Geographic Information Science. This encompasses GIS, remote sensing, spatial disaggregation techniques and geovisualization. Several case studies in Austria and Germany demonstrate a top-down methodology and some results while stepwise calculating potentials from theoretical to technically feasible potentials and setting the scene for the definition of economic potentials based on scenarios and assumptions.

5. [Novel sustainable composites prepared from cork residues and biopolymers](#)

ผู้แต่ง: Carla Vilela, Andreia F. Sousa, Carmen S.R. Freire, Armando J.D. Silvestre, Carlos Pascoal Neto

วารสาร: Biomass and Bioenergy, Volume 55, August 2013, Pages 148–155

Abstract: Novel low-density biocomposites based on cork and two biodegradable matrices, poly(lactic acid) and poly(caprolactone), were prepared by simple melting-mixing. The surface acylation of cork was studied as a strategy to increase the compatibility with the matrices. The obtained composites were characterized in terms of thermal and mechanical properties, morphology, density and water absorption behavior. All composites showed a good dispersion of cork and a strong interfacial adhesion between the cork particles and the polymeric matrices as evidenced by SEM. The Young's modulus values of the composites were little affected for cork loads up to 10%; but for higher loadings, a considerable decrease on this parameter was observed resulting in more flexible materials. These sustainable cork based materials could find applications in several domains such as in flooring and structural applications, depending on the amount of cork and the polymeric matrix used.

6. [Design improvements and performance testing of a biomass gasifier based electric power generation system](#)

ผู้แต่ง: P. Raman, N.K. Ram

วารสาร: Biomass and Bioenergy, Volume 56, September 2013, Pages 555–571

Abstract: The objective of the research work, reported in this paper is, to design and develop a down draft gasifier based power generation system of 75 KW_e. A heat exchanger was designed and installed which recycles the waste heat of the hot gas, to improve the efficiency of the system. An improved ash removal system was introduced to minimize the charcoal removal rate from the reactor, to increase the gas production efficiency. A detailed analysis of the mass, energy and elemental balance is presented in the paper. The cold gas efficiency of the system is increased from 75.0% to 88.4%, due to the improvements made in the ash removal method. The Specific Fuel Consumption (SFC) rate of the system is 1.18 kg kWh⁻¹. The energy conversion efficiency of the system, from fuel wood to electric power was found to be 18%. Significant increase in calorific value of the producer gas was achieved by supplying hot air for gasification.

7. [Medicago spp. extracts as promising ingredients for skin care products](#)

ผู้แต่ง: Francisca Rodrigues, Ana Palmeira-de-Oliveira, José das Neves, Bruno Sarmento, Maria Helena Amaral, Maria Beatriz Oliveira

วารสาร: Industrial Crops and Products, Volume 49, August 2013, Pages 634–644

Abstract: Agro-industrial by-products have the potential to be used with different purposes thus providing economical advantage to otherwise disposable residues. In particular, the field of skin care products and cosmetics may benefit from these remaining materials. Hydro-alcoholic extracts of seven species of *Medicago* (*M. minima*, *M. tornata*, *M. truncatula*, *M. rigidula*, *M. scutellata*, *M. segitatis* and *M. sativa*) were screened for antioxidant, cytotoxicity and antimicrobial activities aiming at their application as functional ingredient in skin formulations. Antioxidant activity was evaluated by standard methods such as DPPH and FRAP. In both methods the antioxidant activity of *M. segitatis* displayed the highest antioxidant activity (214.49 ± 6.69 μmol Trolox equivalent per g db for DPPH; 120.84 ± 1.86 μmol/mg db for FRAP). For DPPH *M. rigidula* showed the lowest antioxidant activity (127.18 ± 1.96 μmol Trolox equivalent per g db) and for FRAP *M. minima* showed the lowest one (58.05 ± 6.09 μmol per mg db). Also, the total phenolic and total flavonoid contents (TPC and TFC, respectively) were evaluated. The TPC of the different extracts varied from 21.96 mg to 36.41 mg GAE/g db sample, being the highest TPC obtained for *M. minima* and the lowest for the *M. scutellata*. TFC varied from 5.54 to 11.67 mg CEQ/g db sample. Linear negative correlations were established between the total phenol contents and for both the antioxidant activity methods. The extracts were also screened for cytotoxicity using MTS and LDH assays in two different skin cell lines (HaCaT and HFF-1) and showed low cytotoxicity. Preliminary assays for antimicrobial potential showed that extracts from *Medicago* display antibacterial activity, with MIC values of 31.3 μg/mL and 125 μg/mL for some Gram-positive and Gram-negative bacteria, respectively. Taken together, the results suggested that *Medicago* hydro-alcoholic extracts are a potential source of natural compounds with high levels of antioxidant activity, low cytotoxicity for skin cells and the ability to potentially prevent microbial infections of the

skin due to its antimicrobial effect, as well as contribute as a natural preservative in cosmetic products. All referred above justify their possible uses in skin care products.

[8. Evaluation of anti-oxidative activity and UV absorption potential of the extracts of *Aloe vera* L. gel from different growth periods of plants](#)

ผู้แต่ง: Anirban Ray, S. Dutta Gupta, Sampad Ghosh

วารสาร: Industrial Crops and Products, Volume 49, August 2013, Pages 712–719

Abstract: Antioxidant assay, ATR-FTIR spectroscopy mediated predominant functional group detection and UV-absorption spectroscopy have been carried out with methanolic extracts of *Aloe vera* L. gel (gel-extract) from two, three and four-year-old plants in summer season. To explore the seasonal influence gel-extract has also been prepared from three-year-old aloe in rainy and winter season. Gel-extracts from three-year-old aloe in winter exhibited high response at IR and UV absorption spectrum. Maximum transmittance in IR spectrum has been assigned to phenolic —OH stretching followed by C—H , =CO and —COC . Total phenols, flavonoids and flavonols content range from 30.11 ± 1.89 to 35.77 ± 1.07 $\mu\text{g GAE/mg}$, 11.00 ± 0.88 to 29.75 ± 0.88 $\mu\text{g RE/mg}$ and 7.47 ± 0.31 to 13.87 ± 0.08 $\mu\text{g RE/mg}$, respectively. The contents of total phenolics, flavonoids, flavonols, aloin, and different free radical scavenging, transition metal chelating and Fe^{3+} reducing are more pronounced in the gel-extracts from three-year-old aloe at winter and summer season. Phenolics concentration and the distribution of aloin in the gel-extract are significantly ($p \leq 0.05$) influenced by the growth periods of *A. vera*. The presence of conjugated double bonds and high abundance of the integral phenolic —OH attribute to the UV absorption and antioxidant potential of the gel-extract, respectively. The present work analysis shows that growth periods of *A. vera* plays a decisive factor in the regulation of antioxidant activity and UV absorption property of the gel-extracts.

[9. Treatment of seasonal wastewater flows in a two-pond system](#)

ผู้แต่ง: Caroline P. Whalley, Sonia Heaven, Charles J. Banks, Andrew M. Salter

วารสาร: Biosystems Engineering, Volume 115, Issue 4, August 2013, Pages 408–414

Abstract: A waste stabilisation pond system comprising two ponds was used to treat a seasonal discharge from a summer campsite in the UK. Despite a short retention time and relatively high surface loading, the first pond was able to acclimate rapidly to the incoming wastewater, although dissolved oxygen (DO) concentrations remained low. Successful operation was due in part to initial dilution of incoming load at the start of the season by treated water retained over the winter period. The two ponds in series produced a final effluent which met typical chemical and biochemical oxygen demand standards for discharge to inland waters; as expected nutrient concentrations were above typical limit values, making land application for irrigation a preferred option. The system performance was adversely affected by short periods (3–4 days) of low average light intensity, leading to reduced chlorophyll-*a* and DO concentrations which did not immediately respond to subsequent increases in irradiance. A light-dark bottle technique, adapted to determine net oxygen production potentials under standard conditions of

illumination, mixing and temperature, was found to provide an excellent indicator of pond metabolic status and treatment potential.

10. [Plant leaf detection using modified active shape models](#)

ผู้แต่ง: Chunlei Xia, Jang-Myung Lee, Yan Li, Yoo-Han Song, Bu-Keun Chung, Tae-Soo Chon

วารสาร: Biosystems Engineering, Volume 116, Issue 1, September 2013, Pages 23–35

Abstract: We propose an *in situ* detection method of multiple leaves with overlapping and occlusion in greenhouse conditions. Initially a multilayer perceptron (MLP) is used to classify partial boundary images of pepper leaves. After the partial leaf boundary detection, active shape models (ASMs) are subsequently built to employ the images of entire leaves based on a *a priori* knowledge using landmark. Two deformable models were developed with pepper leaves: Boundary-ASM and MLP-ASM. Matching processes are carried out by deforming the trained leaf models to fit real leaf images collected in the greenhouse. MLP-ASM detected 76.7 and 87.8% of overlapping and occluded pepper leaves respectively, while Boundary-ASM showed detection rates of 63.4 and 76.7%. The detection rates by the conventional ASM were 23.3 and 29.3%. The leaf models trained with pepper leaves were further tested with leaves of paprika, in the same family but with more complex shapes (e.g., holes and rolling). Although the overall detection rates were somewhat lower than those for pepper, the rates for the occluded and overlapping leaves of paprika were still higher with MLP-ASM (ranging from 60.4 to 76.7%) and Boundary-ASM (ranging from 50.5 to 63.3%) than using the conventional active shape model (from 21.6 to 30.0%). The modified active shape models with the boundary classifier could be an efficient means for detecting multiple leaves in field conditions.