

1. [Thermal energy storage technologies and systems for concentrating solar power plants](#)

ผู้แต่ง: Sarada Kuravi, Jamie Trahan, D. Yogi Goswami, Muhammad M. Rahman, Elias K. Stefanakos

วารสาร: Progress in Energy and Combustion Science, Volume 39, Issue 4, August 2013, Pages 285–319

Abstract: This paper presents a review of thermal energy storage system design methodologies and the factors to be considered at different hierarchical levels for concentrating solar power (CSP) plants. Thermal energy storage forms a key component of a power plant for improvement of its dispatchability. Though there have been many reviews of storage media, there are not many that focus on storage system design along with its integration into the power plant. This paper discusses the thermal energy storage system designs presented in the literature along with thermal and exergy efficiency analyses of various thermal energy storage systems integrated into the power plant. Economic aspects of these systems and the relevant publications in literature are also summarized in this effort.

2. [Mathematical modelling of anaerobic digestion of biomass and waste: Power and limitations](#)

ผู้แต่ง: Joost Lauwers, Lise Appels, Ian P. Thompson, Jan Degrève, Jan F. Van Impe, Raf Dewil

วารสาร: Progress in Energy and Combustion Science, Volume 39, Issue 4, August 2013, Pages 383–402

Abstract: Anaerobic digestion is an excellent technique for the energetic valorisation of various types of biomass including waste forms. Because of its complex nature, the optimisation and further process development of this technology go hand in hand with the availability of mathematical models for both simulation and control purposes. Over the years, the variety of mathematical models developed has increased as have their complexity. This paper reviews the trends in anaerobic digestion modelling, with the main focus on the current state of the art. The most significant simulation and control models are highlighted, and their effectiveness critically discussed. The importance of the availability of models that are less complex, which can be used for control purposes, is assessed. The paper concludes with a discussion on the inclusion of microbial community data in mathematical models, an innovative approach which could drastically improve model performance.

3. [Combustion and flame spread on fuel-soaked porous solids](#)

ผู้แต่ง: Jafar Zanganeh, Behdad Moghtaderi, Hiroki Ishida

วารสาร: Progress in Energy and Combustion Science, Volume 39, Issue 4, August 2013, Pages 320–339

Abstract: Fires caused by accidental spillage of flammable liquids have been a major safety concern in industries and urban areas. There has been a recent surge of interest in the research concerning the combustion and flame spread over an inert porous media soaked with flammable liquid. This interest has been driven by the need to better understand fire and its behaviour under these conditions and improve the relevant fire safety and prevention technologies. A review of key studies in this subject area has been conducted and summarised, focussing mainly on the theory plus a notable experimental findings about combustion and the flame spread phenomena of fuel-soaked porous media. The review covers topics such as flame

spread behaviour, physical flame propagation aspects, heat transfer, temperature distribution; and fuel consumption over inert porous media. The review concludes with some practical safety and environmental considerations for decontamination of land soaked with flammable liquid.

4. [Estimation of multi-junction solar cell parameters](#)

ผู้แต่ง: Asaf Ben Or and Joseph Appelbaum

วารสาร: Progress in Photovoltaics: Research and Applications, Volume 21, Issue 4, pages 713–723, June 2013

Abstract: The paper deals with the parameter estimation of InGaP/GaAs/Ge multi-junction solar cell and is based on minimizing the difference between the measured I - V and the theoretical I - V characteristics—the objective function. The parameter estimation was first performed on a multi-junction solar cell represented by a single-diode model containing eight parameters: five conventional parameters and three additional parameters for the negative diode breakdown voltage. An extended model is also presented for detailed analysis of the multi-junction cell containing three subcells connected in series. In this model, each subcell is represented by eight parameters, and therefore a total of 24 parameters describe the cell. The parameter estimation procedure requires derivatives of the first and the second order of an objective function, filtering of noisy measurements, iteration algorithm, guessing of initial parameters, zero finding, and stopping criteria. The paper presents a mathematical method and a procedure for extracting solar cell parameters based on I - V measured data. The parameters' values may be used for analysis of the current mismatch of the subcells, the power loss, the output power of the multi-junction cell for different environmental conditions, and to some extent, for cell fabrication.

5. [A mechanism of solar cell degradation in high intensity, high temperature space missions](#)

ผู้แต่ง: Zimmermann, C. G., Nömayr, C., Kolb, M. and Rucki, A.

วารสาร: Progress in Photovoltaics: Research and Applications, Volume 21, Issue 4, pages 420–435, June 2013

Abstract: The behavior of standard space photovoltaic assemblies in a high intensity, high temperature environment (HIHT) is addressed. Experimentally, an HIHT environment, typical for missions to the inner planets of the solar system such as Mercury, characterized by temperatures of 500K and 11 solar constant irradiance in the ultraviolet region below 400 nm, was simulated in a vacuum. Independently of the triple junction cell technology used, module degradation up to 20% in power was observed during several hundred hours of test. Electroluminescence analysis identified discrete top cell shunts close to the cell edge, in particular around the frontside contact pads. Cross-sectional transmission electron microscopy performed on several degraded cells revealed an etched contact pad metallization/cap layer interface and more importantly, several 100-nm large, oriented Cu_3P inclusions at the shunted locations. A chemical degradation mechanism is proposed. Short wavelength ultraviolet light interacting with polysiloxanes used as module encapsulant produces hydrogen and methyl radicals. With these building blocks, an organic acid can be formed on external reaction surfaces such as the Ag busbars that simultaneously serve as a source of oxygen. Cu traces present in the Ag segregate to the surface and are transported by this acid to the contact pad of the cell in the liquid phase. An adapted cell design was developed to prevent this degradation mechanism believed to be of

relevance for all HIHT space environments. A several hundred micrometer-wide rim composed of the outermost cell area is electrically separated from the inner cell area and provides a barrier against environmental attack. None of the photovoltaic assemblies featuring this mesa cell design showed any fill factor-induced power degradation any more.

6. [Bio-oil valorization: A review](#)

ผู้แต่ง: Kathlene Jacobson, Kalpana C. Maheria, Ajay Kumar Dalai

วารสาร: Renewable and Sustainable Energy Reviews, Volume 23, July 2013, Pages 91–106

Abstract: Fuels from biomass (biofuels) are used to mitigate the greenhouse gases produced through the utilization of fossil fuels. Non-edible or waste biomass can be pyrolyzed to produce bio-oil. The oil, an unstable and low energy product, can be further upgraded through hydrodeoxygenation to produce gas and/or diesel range hydrocarbons and value added chemicals. The objective of this review is to explore upgrading techniques that are currently being researched and utilized. This review reveals several aspects that in turn will serve as an aid for bio oil valorization, such as, evaluating characterization techniques involved in understanding salient features of bio-oil, insight of bio-oil pretreatment methods for water removal to increase heating values and decrease risk of catalyst poisoning in subsequent hydroprocessing, studies regarding model compound upgrading, reaction mechanism and finally, provides brief review of common catalysts for hydrotreatment of bio-oil in order to yield value added chemicals and fuels.

7. [A review of energy aspects of green roofs](#)

ผู้แต่ง: Omidreza Saadatian, K. Sopian, E. Salleh, C.H. Lim, Safa Riffat, Elham Saadatian, Arash Toudeshki, M.Y. Sulaiman

วารสาร: Renewable and Sustainable Energy Reviews, Volume 23, July 2013, Pages 155–168

Abstract: Global warming, depletion of natural resources, acid rains, air and water pollutions, and ozone depletions are some of the environmental consequences that are deemed attributable to human activities on planet earth. Sustainable practices have been therefore evolved as main remedies to tackle these issues. Green roof strategy is one of these practices that not only provides heat island amelioration and thermal comfort for occupants but also reduces energy consumption of buildings as well as add aesthetic values to the environment. This paper targets to run a review on the application of green roof strategy. The review scans a time frame from 2002 through early 2012 with a focus on energy related topics on energy related topics of green roofs. The review discussed various types of green roofs, components of a green roof, economic revenues, and technical attributes. Many general advantages and few general disadvantages of green roofs in one hand and pros and cons of green roofs with respect to energy utilization on the other hand are also synthesized. Some recommendations for future study are also proposed.

8. [Wind turbine reliability analysis](#)

ผู้แต่ง: Jesús María Pinar Pérez, Fausto Pedro García Márquez, Andrew Tobias, Mayorkinos Papaefelis

วารสาร: Renewable and Sustainable Energy Reviews, Volume 23, July 2013, Pages 463–472

Abstract: Against the background of steadily increasing wind power generation worldwide, wind turbine manufacturers are continuing to develop a range of configurations with different combinations of pitch control, rotor speeds, gearboxes, generators and converters. This paper categorizes the main designs, focusing on their reliability by bringing together and comparing data from a selection of major studies in the literature. These are not particularly consistent but plotting failure rates against hours lost per failure reveals that problems with blades and gearboxes tend to lead to the greatest downtimes. New, larger wind turbines tend to fail more frequently than smaller ones so condition monitoring will become increasingly necessary if levels of reliability are to be improved.

9. [Towards biofuel combustion with an easily extruded clay as a natural catalyst](#)

ผู้แต่ง: Zhen-Yu Tian, Tarik Chafik, Mhamed Assebban, Sanae Harti, Naoufal Bahlawane, Patrick Mountapmbeme Kouotou, Katharina Kohse-Höinghaus

วารสาร: Applied Energy, Volume 107, July 2013, Pages 149–156

Abstract: The present work aims to investigate an innovative application of natural clay as a catalyst for biofuel combustion. The mineralogical, chemical, thermal and textural characterizations of the natural clay suggest an intrinsic catalytic potential without any prior treatment. The catalytic performance was studied with respect to the combustion of *n*-butanol as a representative biofuel using different forms of the natural clay: fine powder, pressed pellets and extruded honeycomb monoliths. No major difference was found among these forms regarding texture, morphology and stability. In terms of performance, this clay proved competitive relative to cobalt oxide spinel, which is one of the most reactive non-noble transition metal oxides. The significant amount of naturally occurring transition metals such as iron and some elements considered as promoters in the clay were proposed to account for the catalytic properties. A systematic investigation of the catalytic performance of the clay as a function of the equivalence ratio and of the total flow rate was performed using gas-phase FTIR spectroscopy. Increase of the equivalence ratio at a fixed flow rate yielded a lower catalytic performance toward *n*-butanol combustion producing a consequent fraction of carbon monoxide and ethylene. At a constant equivalence ratio of 0.6, the performance of the clay was not affected by increasing the total inlet flow rate up to 30 sccm. These findings may initiate the development of a new catalyst for biofuel combustion based on relatively low-cost and abundantly available raw materials such as the natural clay investigated here.

10. [Biogas production from microalgae grown in wastewater: Effect of microwave pretreatment](#)

ผู้แต่ง: Fabiana Passos, Maria Solé, Joan García, Iveta Ferrer

วารสาร: Applied Energy, Volume 108, August 2013, Pages 168–175

Abstract: The aim of this study was to evaluate the effect of microwave pretreatment on the solubilisation and anaerobic digestion of microalgae–bacterial biomass cultivated in high rate algal ponds for wastewater treatment. The microwave pretreatment comprised three specific energies (21,800, 43,600 and 65,400 kJ/kg TS), combining three output power values with different exposure times. Response surface analysis showed that the main parameter influencing biomass solubilisation

was the applied specific energy. Indeed, a similar solubilisation increase was obtained for the same specific energy, regardless of the output power and exposure time (280–350% for 21,800 kJ/kg TS, 580–610% for 43,600 kJ/kg TS and 730–800% for 65,400 kJ/kg TS). In biochemical methane potential tests, the initial biogas production rate (27–75% increase) and final biogas yield (12–78% increase) were higher with pretreated biomass. A linear correlation was found between biomass solubilisation and biogas yield. It can be concluded that microwave irradiation enhanced the disintegration and digestibility of microalgae.