Dawn of the Environment-Enhancing Era:

Preface of EC2SH2012

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The 2nd Environment-enhancing Energy and Biochemicals Conference (EC2SH2012) was successfully held in the Academic Activity Center of the Shanghai Jiaotong University Minhang Campus on August 11-13, 2012. It was organized by the School of Chemistry and Chemical Engineering, Shanghai Jiaotong University, Chinese Center for Resource Comprehensive Utilization Technology, and University of Illinois at Urbana-Champaign. China Agricultural University, Zhejiang University and University of Arizona co-sponsored this conference.

Around the globe, energies and carbon dioxide emissions are of great concern for all the countries. The energy production from chemicals and environmental protection are two major challenges facing mankind in the 21st century. Countries have to bear the unprecedented responsibility in tackling these challenges. Environmental-enhancing energy and chemical technology, is the third generation of energy and green chemistry. It uses sustainable and renewable resources to control the emissions in the environment. It is efficient, and ultimately can meet the human demand for long-term liquid fuel. The main topics of this meeting include: issues regarding bio-energy, environment, national security, social and economic development; a new generation of hydrocarbon fuels and cutting-edge technology of the new chemicals; biomass production of bio-technology and engineering; biomass conversion and catalysis; the transformation of animal produced bio-wastes, as well as food processing, in the production of liquid fuels and chemicals; for the production of liquid fuels and chemicals from biomass of algae and lignin; bio-energy and chemical production in the waste water purification and water resources; carbon recycling and nutrient reuse.

There are 20 papers accepted in the *Advanced Materials Research* Supplementary of EC2SH2012 out of 78 submissions. Each submission has been peer reviewed and evaluated by two or three independent reviewers on the quality, originality, soundness, and significance of its contributions and the significant improvement. We would like to thank all the authors who submitted their manuscripts to EC2SH2012, and also thank the reviewers for their invaluable contributions to the peer review process.

In their paper ‘Pyrolysis of Waste Plastics: Effect of Heating Rate on Product Yields and Oil Properties’, Tao et al selected polyethylene (PE), polypropylene (PP),

polyvinyl chloride (PVC) and their mixture PE/PP/PVC as experimental samples, and investigated the effect of heating rate on the yields of pyrolysis products, including cracking oil, gas and residue, as well as the oil properties by a series of experiments and drew some conclusions, which may be able to provide reference for the optimization of pyrolysis process parameters of waste plastics.

In Jilin University, Ma's lab is actively engaged in the preparation of biodegradable films and study of their mechanical properties. X. Wang et al investigated the effect of drying time, drying temperature, plasticizer and thickening agents on the mechanical properties of cabbage-based edible films, and the results are presented in their paper 'Mechanical properties of Cabbage-based Edible Films'. Gas-selective permeability of films obtained from soy protein isolate (SPI) is important for developing environmental friendly film, and Z. Wang et al studied and compared the effects of ultrasonic, microwave and ultrasonic/microwave assisted treatment in 'Gas-selective Permeability of Soy Protein Isolate Film'. Meanwhile, T. Zhong et al studied mechanical properties of methylcellulose-based films containing stearic acids, and the influence of the microwave and ultrasonic synergistic effect on properties of methylcellulose/stearic acids films, as well as how fatty acids may affect the properties of methylcellulose-based bi-layer edible films. Their findings are presented in the three papers under the respective names.

The bacterial contamination may cause the failures of microalgal cultivation in soybean processing wastewater. It is interesting to investigate the influence of bacteria during cultivation of *Chlorella pyrenoidosa* in soybean processing wastewater. This work is valuable for the research field. Y. Zhong and Y. Zhang, both from Tongji University, performed the aforementioned study, which is outlined in their paper 'Influence of contaminative bacteria during cultivation of *Chlorella pyrenoidosa* in soybean processing wastewater'. They and their colleagues, Jiang et al, also described in paper 'simulation of nitrogen and phosphorus removal in AmOn integrative reactor by activated sludge model 2D', that it is clear AmOn integrative process has many merits compared with traditional methods.

M. Wang et al proposed to apply electrochemical pretreatment combined with *Chlorella vulgaris* cultivation to treat the synthetic wastewater. In their paper 'Effect of synthetic wastewater by electrochemical pretreatment on *Chlorella vulgaris* growth and nutrients removal', the efficiency of electrochemical treatment for nutrients removal from the wastewater was evaluated and the effect of the electrochemical pretreatment on the algal biomass growth and nutrients uptake by algae was also determined. Finding of this study indicates that electrolysis pretreatment for wastewater can provide appropriate conditions for the subsequent biological treatment and efficiently promote the biomass growth of *Chlorella vulgaris*.

Ulva pertusa is one of the native algae species in China which is fast growing macro algae and has high nutritional. Anaerobic fermentation of *Ulva pertusa* for producing methane was experimentally studied at different temperatures and by adding waste paper as auxiliary feedstock. In their paper 'Effects of fermentation temperature and waste paper (as auxiliary feedstock) on biogas yield of *Ulva pertusa*', X. Li et al investigated two factors including fermentation temperature and extra

carbon. Biogas recovery from waste sea biomass via anaerobic digestion is an interesting topic.

In paper 'Catalytic Conversion of tar compounds from biomass over modified Ni/olivine catalysts', C. Zhang et al described the catalytic conversion of tar compounds by their catalysts. The results are pretty interesting since they contain some useful information for the conversion of biomass, because the carbon deposition restricted the utilization efficiency of carbon from biomass. Also the high reactivity of MgO is very interesting.

In China, Tetranychus cinnabarinus is an important mite on many crops and its tolerance to the chemical pesticides are popular. In the work presented in paper 'Acaricidal activities of Albizzia julibrissin Durazz extracts against Tetranychus cinnabarinus', D. Wang et al prove that Albizzia julibrissin Durazz has the potential value as a phytochemical miticide, which is reported for the first time in the world. The paper also showed that extract of stems and leaves of Albizzia julibrissin Durazz owns a stronger acaricidal and ovicidal activities against T. cinnabarinus.

In the paper "Fermentation of lignocellulosic wastes for volatile fatty acids at different temperatures under alkaline condition", L. Li et al investigated the hydrolysis and acidification of lignocellulosic wastes for volatile fatty acids at different temperatures (10℃~55℃) under strong alkaline condition of pH=12 in the anaerobic digestion process of wetland plant litter (WPL). The results showed that the hydrolysis of WPL was enhanced under pH12 and the hydrolysis of WPL was accelerated as the temperature increased. The 25 degree Celsius could be considered as the optimal conditions for VFAs accumulation at pH12 in the study as both the quantity and quality of the carbon sources achieved a higher level. The results above would be the theoretical basis and technical support for enhancing the denitrification efficiency and recycling the plant litter when using the VFAs produced by WPL as the external carbon source for the denitrification.

In their paper 'Transesterification of Jatropha Oil to Biodiesel by Using Catalyst Containing $Ca(C_3H_7O_3)_2$ as a Solid Base Catalyst', C. Li et al demonstrate a viable solid catalyst (calcium diglyceroxide) for bio-oil transesterfication. The glyceroxide material was nicely characterized with XRD, NMR, and FTIR. Reactivity measurements included the finding of an optimal methanol/oil ratio and loading of catalyst. Deactivation in the reaction medium was shown to be an issue, while stability in air is less of one. The preparation method is simple and the initial results are encouraging.

Based on largely the theory of Environmental Kuznets Curve (EKC), the paper 'The Carbon Emissions Rights Optimization under Regional Economic Growth Disparities' by Xie et al builds a carbon emissions rights optimization model under regional economic growth disparities. After empirical analysis and discussion, the authors have proposed two strategies to tackle with the issues of carbon emission in China. This paper has presented a very interesting research hit as to how to make carbon emission regulation to make the economy developing sustainably. Here it means the carbon emission right. Through the modeling, the authors have provided us a way of carbon emissions rights optimization.

B. Zhang et al from Shanghai University and their collaborators bring two papers to the conference. The paper ‘Preparation and modification of carbon blacks from wastes’ gives an overview of the different methods which are considered. In the paper ‘Preparation and properties of thermo-sensitive resin for processless CTP plate’ a new type of thermo-sensitive resin is prepared. Authors investigated in detail its solublility and thermal stability and demonstrated its promising application in processless CTP plate.

In the research reported by J. Zhang et al in their paper ‘Catalytic performance of SO42-/TiO2 for the conversion of high fructose corn syrup’, the specific relationship among preparation method, catalyst structure and corresponding catalytic activity are studied. The physicochemical properties of the prepared and thermally regenerated SO_4^{2-}/TiO_2 catalysts are characterized to illustrate the specific changes on catalyst structures using several analysis tools. This will solve one of the major problems for achieving efficient catalysts to catalytic conversion of biomass resources into high value-added chemicals. Therefore, efficient solid acid catalysts and higher 5-HMF yield will be obtained as the preceding problems have been deep investigated.

Finally, we introduce two papers presented by people in our own group, ‘The new technologies in chitin/chitosan preparation’ and ‘The latest applications of chitin and chitosan in wastewater treatment’. Yang, H. Zhang and us reviewed the new development in the extraction methods of chitin/chitosan from raw materials, as well as their applications in wastewater treatment. We believe the work is interesting for readers of the journal.

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