About this Series

“Lecture Notes in Electrical Engineering (LNEE)” is a book series which reports the latest research and developments in Electrical Engineering, namely:

- Communication, Networks, and Information Theory
- Computer Engineering
- Signal, Image, Speech and Information Processing
- Circuits and Systems
- Bioengineering

LNEE publishes authored monographs and contributed volumes which present cutting edge research information as well as new perspectives on classical fields, while maintaining Springer’s high standards of academic excellence. Also considered for publication are lecture materials, proceedings, and other related materials of exceptionally high quality and interest. The subject matter should be original and timely, reporting the latest research and developments in all areas of electrical engineering.

The audience for the books in LNEE consists of advanced level students, researchers, and industry professionals working at the forefront of their fields. Much like Springer’s other Lecture Notes series, LNEE will be distributed through Springer’s print and electronic publishing channels.

More information about this series at http://www.springer.com/series/7818
Tong-Cun Zhang · Motowo Nakajima
Editors

Advances in Applied Biotechnology

Proceedings of the 2nd International Conference on Applied Biotechnology (ICAB 2014)-Volume I

Springer
Preface

The 2014 International Conference on Applied Biotechnology (ICAB 2014), organized by Chinese Society of Biotechnology and Tianjin University of Science, was held from November 28 to 30, 2014 in Tianjin, China.

The conference served as a forum for exchange and dissemination of ideas and the latest findings in aspects of applied biotechnology. The conference was complemented by talks given by more than 30 professors and researchers.

The conference papers were submitted by more than 100 authors from different universities, institutes and companies. Numerous fields were covered, ranging from fermentation engineering, cell engineering, genetic engineering, enzyme engineering to protein engineering.

Special thanks are given to Secretary Staff of the conference for the commitment to the conference organization. We would also like to thank all the authors who contributed with their papers to the success of the conference.

This book gathers a selection of the papers presented at the conference. It contains contributions from both academic and industrial researchers focusing on the research and development of applied biotechnology from all over the world. The scientific value of the papers also helps researchers in this field to get more valuable results.

Tianjin, China
Tong-Cun Zhang
Tokyo, Japan
Motowo Nakajima
Contents

Part I  Microbial Genetics and Breeding

1 Cloning and Bioinformatics Analysis of spsC Gene from *Sphingomonas sanxanigenens* NX02. .......................... 3
Xiaoyan Li, Haidong Huang, Mingming Zhou and Peng Zhang

2 Preliminary Study on Salt Resistance Seedling Trait in Maize by SRAP Molecular Markers ........................ 11
Chunyang Xiang, Jin Du, Peipei Zhang, Gaoyi Cao and Dan Wang

3 Isolation of Differentially Expressed Genes from Groundnut Genotypes Differing in Seed Dormancy ..................... 19
Bo Qu, Yue Yi Tang, Xiu Zhen Wang, Qi Wu, Quan Xi Sun, Shu Yan Guan, Chuan Tang Wang and Pi Wu Wang

4 Increase of the Lycopene Production in the Recombinant Strains of *Escherichia coli* by Supplementing with Fructose ...... 29
Tong-Cun Zhang, Wen Li, Xue-Gang Luo, Cui-Xia Feng, Ming-Hui Zhang, Wen Du and De-Yun Ma

5 Isolation of Differentially Expressed Genes from Developing Seeds of a High-Protein Peanut Mutant and Its Wild Type Using Genefishing™ Technology .......................... 37
Shu Tao Yu, Hong Bo Yu, Guo Qing Yu, Li Ren Zhao, Hong Xi Sun, Yue Yi Tang, Xiu Zhen Wang, Qi Wu, Quan Xi Sun and Chuan Tang Wang

6 Identification of the Binding Domains of Nedd4 E3 Ubiquitin Ligase with Its Substrate Protein TMEPAI ....................... 47
Lei Jing, Xin Huo, Yufeng Li, Yuyin Li and Aipo Diao
7 Optimization of the Fermentation Conditions of Pep-1-Fused EGF in Escherichia coli ............................... 55
   Tong-Cun Zhang, De-Yun Ma, Xue-Gang Luo and Yue Wang

8 Characterization of Rhamnolipid Production in a Pseudomonas aeruginosa Strain ...................... 61
   Cuikun Zhang and Hongjiang Yang

9 High-Quality Protein-Encoding Gene Design and Protein Analysis ........................................... 73
   Guo-qing Huang, Lei Wang, Dong-kai Wang, Qiong Wu, Yao Li, Jin-hai Zhao and Di-fei Cao

10 Isolation and Characterization of a Highly Siderophore Producing Bacillus subtilis Strain. ............. 83
    Huiming Zhu and Hongjiang Yang

11 Isolation and Identification of an Inulinase-Producing Strain and the Optimization of Its Fermentation Condition ........... 93
    Yang Zhang, Hongyang Zhu, Jinhai Wang, Xiuling Zhou, Wei Xu and Haiying Shi

12 Isolation and Identification of a Cellulose-Producing Bacterial Strain from the Genus Bacillus ........... 109
    Hongyang Zhu, Yang Zhang, Jinhai Wang, Yongning Li and Weiling Lin

13 Improved Lactose Utilization by Overexpression β-Galactosidase and Lactose Permease in Klebsiella pneumoniae . 121
    Xuewu Guo, Yazhou Wang, Xiangyu Guan, Yefu Chen, Cuiying Zhang and Dongguang Xiao

14 Breeding High Producers of Enduracidin from Streptomyces fungicidicus by Combination of Various Mutation Treatments . 133
    Dong Zhang, Qingling Wang and Xinle Liang

15 Expression of Stichopus japonicus Lysozyme Gene in Bacillus subtilis WB600 ............................. 143
    Zhiwen Liu, Xingyu Liao, Lu Sun, Dan Zou, Dan Li and Lina Cong
16 Mega-Genome DNA Extraction from Pit Mud ................................. 155
   Huimin Xie, Yali Dai and Lin Yuan

17 Evidence for a Link of SDPR and Cytoskeleton ............................. 165
   Baoxia Zhang, Jun Zhu, Liqiao Ma, Yuyin Li, 
   Aipo Diao and Yinchuan Li

18 CREB Regulated Transcription Coactivator 1 (CRTC1)
   Interacts with Microtubules. ........................................... 173
   Liqiao Ma, Yu Sun, Baoxia Zhang, Yuyin Li, 
   Aipo Diao and Yinchuan Li

19 The Biological Effects of Carbon Nanotubes in Plasma
   Membranes Damage, DNA Damage, and Mitochondrial Dysfunction ........ 179
   Zhuo Zhao, Zhi-Peng Liu, Hua Wang, Feng-Juan Liu, Hui Zhang, 
   Cong-Hui Zhang, Chen-Guang Wang and Xiao-Chuan Jia

20 Evidence of the Interplay of Menin, CRTC1 and THOC5
   Triangles ................................................................. 189
   Lichang Wu, Qiwen Zhang, Liqiao Ma, Yu Sun, Baoxia Zhang, 
   Caicai Kang, Aipo Diao and Yinchuan Li

Part II Optimization and Control of Biological Process

21 Classification of Lymphoma Cell Image Based
   on Improved SVM .............................................................. 199
   Ting Yan, Quan Liu, Qin Wei, Fen Chen and Ting Deng

22 Foam Control in Epothilones Fermentation of
   Sorangium cellulosum ....................................................... 209
   Yue Liu, Lin Zhao, Hongrui Zhang, Fuming He and Xinli Liu

23 Acute Toxicity by Four Kinds of Oil Dispersants
   in Cynoglossus semilaevis .................................................. 219
   Jinwei Gao, Wenli Zhou and Ruinan Chen

24 Imprinted Cross-Linked Enzyme Aggregate (iCLEA)
   of Phenylalanine Ammonia Lyase: A New Stable Biocatalyst ............. 223
   Jian Dong Cui, Rong Lin Liu and Lian Lian Li
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Effects of Calcium on the Morphology of <em>Rhizopus oryzae</em> and L-lactic Acid Production</td>
<td>233</td>
</tr>
<tr>
<td></td>
<td>Yong-Qian Fu, Long-Fei Yin, Ru Jiang, Hua-Yue Zhu and Qing-Cheng Ruan</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Estimation of Dietary Copper (Cu) Requirement of <em>Cynoglossus semilaevis Günther</em></td>
<td>245</td>
</tr>
<tr>
<td></td>
<td>Qingkui Wang, Yang Zhang, Dongqing Bai, Chengxun Chen, Yongjun Guo and Kezhi Xing</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Influence of Different Substrates on the Production of Pigments and Citrinin by Monascus FJ46</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td>Hongxia Mu, Liubin Huang, Xuemei Ding and Shuxin Zhao</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td><em>FAD2B</em> from a Peanut Mutant with High Oleic Acid Content Was Not Completely Dysfunctional</td>
<td>265</td>
</tr>
<tr>
<td></td>
<td>Xiu Zhen Wang, Qi Wu, Yue Yi Tang, Quan Xi Sun and Chuan Tang Wang</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Optimization of Sterilization Process After Spore Activation for Cereal Beverage in Large-Scale Production</td>
<td>273</td>
</tr>
<tr>
<td></td>
<td>Zhe Li, Liping Zhu, Shigan Yan, Junjie Liu and Wenjuan Zhao</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Optimization of Medium for Exopolysaccharide Production by <em>Agaricus brunnescens</em></td>
<td>283</td>
</tr>
<tr>
<td></td>
<td>Li-tong Ban, Yu Wang, Liang Huang and Hongpeng Yang</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Effect of Attapulgite on Cell Activity of Steroid-Transforming <em>Arthrobacter simplex</em></td>
<td>289</td>
</tr>
<tr>
<td></td>
<td>Yanbing Shen, Hengsheng Zhao, Yanhua Liu, Rui Tang and Min Wang</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Establishment of a Method to Measure the Interaction Between Nedd4 and UbCH5c for Drug Screening</td>
<td>297</td>
</tr>
<tr>
<td></td>
<td>Kunyuan Kou, Jianli Dang, Baoxia Zhang, Guanrong Wu, Yuyin Li and Aipo Diao</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Determination of Phthalate Esters in Tea by Gas Chromatography–Mass Spectrometry</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>Yan Lu, Liping Du, Yang Qiao, Tianlu Wang and Dongguang Xiao</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Antibacterial Mechanism of 10-HDA Against <em>Bacillus subtilis</em></td>
<td>317</td>
</tr>
<tr>
<td></td>
<td>Xiaohui Yang, Junlin Li and Ruiming Wang</td>
<td></td>
</tr>
</tbody>
</table>
35 Monitoring Glutamate and Glucose Concentration During the Temperature Triggered Glutamate Fermentation by Near-Infrared Spectroscopy ........................................ 325
Yongli Gui, Jingbo Liang, Chenglin Zhang, Xixian Xie, Qingyang Xu, Ning Chen and Lei Ma

36 Effect of Sodium Citrate on L-tryptophan Fermentation by Escherichia coli ......................................................... 335
Qing-yang Xu, Li-kun Cheng, Xi-xian Xie, Cheng-lin Zhang, Yan-jun Li and Chen Ning

37 Reduction Reaction of Methyl Condensation Compound by Saccharomyces cerevisiae ........................................ 343
Lu Yu, Shuhong Mao, Shaoxian Ji, Xiaoguang Liu and Fuping Lu

38 Study on Ultrasonic-Assisted Extraction of Essential Oil from Cinnamon Bark and Preliminary Investigation of Its Antibacterial Activity ............................................. 349
Ping Li, Lin Tian and Tao Li

39 Geranyl Butyrate Production by Candida antarctica Lipase B-Displaying Pichia pastoris .............................................. 361
Zi Jin, Janvier Ntwali, Ying Lin, Huang Kui, Suiping Zheng and Shuangyan Han

40 Metabolic Analysis of a Corynebacterium glutamicum IdhA Mutant During an Efficient Succinate Production Using pH-Control Under Oxygen Deprivation ............................................. 375
Chen Wang, Heng Cai, Zhihui Zhou, Hong-gui Wan and Ping-kai Ouyang

41 Effects of Stimulators on Lutein and Chlorophyll Biosyntheses in the Green Alga Chlorella pyrenoidosa Under Heterotrophic Conditions .............................................................. 389
Tao Li, Dongqing Bai, Lin Tian, Ping Li, Yihan Liu and Yue Jiang

42 Pharmacophore-Based Virtual Screening and Result Analysis of Histone Methyltransferase SMYD3 Inhibitors ................. 399
Shaodan Liu, Ziyue Sun, Yonghui Zhong, Qingxin Cui, Xuegang Luo and Yujie Dai
43 Effects of K$_2$HPO$_4$ on the Growth of *Nostoc Flagelliforme* in Liquid Media with Different Carbon Sources ................. 407
Hexin Lv, Feng Xia, Shiru Jia, Xianggan Cui and Nannan Yuan

44 Production of Alkyl Polyglucoside Using *Pichia pastoris* GS115 Displaying *Aspergillus aculeatus* β-Glucosidase I .......... 417
Yajun Kang, Binru Wei, Dongheng Guo and Suiping Zheng

45 Enhancement of Gellan Production in *Sphingomonas paucimobilis* JLJ by Heterogeneous Expression of *Vitreoscilla* Hemoglobin ...................................................... 427
Qinglong Ji, Dan Li, Xiangqian Li, Ting Li and Lin Yuan

46 Enhanced Adenosine Production by *Bacillus subtilis* at Condition with Comprehensively Controlled Dissolved Oxygen and pH During Fermentation ..................... 439
Yue Liu, Juhua He, Qingyang Xu, Chenglin Zhang,
Ning Chen and Xixian Xie

47 The Semi-continuous Cultivation of *Nostoc flagelliforme* Cells .......... 453
Lifang Yue, Yupeng Xiao, Guojuan Sun, Shiru Jia,
Yujie Dai and Xing Zheng

48 Study on Ecological Diversity of Pectase and Its Producing Strains ................................................................. 461
Jing Xiao, Xiwang Zhou, Xiaolong Zhang and Ruiming Wang

Part III Biological Separation and Biological Purification

49 The Extraction and Regeneration of Resin XAD-16
in the Purification of Epothilones ........................................ 469
Can Li, Lin Zhao, Xiaona Wang, Qiang Ren and Xinli Liu

50 Conversion Process of High Color Value Gardenia Red Pigment .......................................................... 479
Shangling Fang, Wei Jiang, Jinhua Cao, Xu Xu,
Yanyan Jing and Maobin Chen

51 Efficient Purification and Active Configuration Investigation
of R-phycocyanin from *Polysiphonia urceolata* ..................... 489
Li-ping Zhu, Shi-gan Yan and Ai-jie Lv
52 Concentration of Sinigrin from Indian Mustard
\textit{(Brassica juncea} L.) Seeds Using Nanofiltration Membrane \ldots \ldots 497
Tianxin Wang, Hao Liang and Qipeng Yuan

53 Optimization of Crude Polysaccharides Extraction
from \textit{Dioscorea esculenta} by Response Surface Methodology \ldots \ldots 509
Kaihua Zhang, Liming Zhang, Na Liu, Jianheng Song and Shuang Zhang

54 Nanofiltration Extraction and Purification Method
for Cyclic Adenosine Monophosphate (cAMP)
from Chinese Date Fruit \ldots \ldots \ldots \ldots \ldots 521
Chunxia Wang, Yihan Liu, Hongbin Wang, Lianxiang Du and Fuping Lu

55 Effect of Manchurian Walnut Extracts on Cancer Cells
Proliferation \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 533
Changcai Zhao, Xing Niu, Rui Huang, Jiali Dong, Yuyin Li and Aipo Diao

56 Extraction and Purification of Lumbrokinase
from the “Ohira the 2nd” Earthworm \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 541
Tianjun Li, Jian Ren, Tao Li and Yingchao Wang

57 Study on Green Crystallization Process for L-glutamic
Acid Production \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 547
Zhi-hua Li, Cheng-lin Zhang and Qing-yang Xu

58 Synthesis of Poly (β-L-malic Acid) by the Optimization
of Inorganic Nitrogen Complexing with Growth
Factors Using \textit{Aureobasidium pullulans} CGMCC3337 \ldots \ldots \ldots 557
Changsheng Qiao, Yumin Song, Zhida Zheng, Xujia Fan and Shiyun Yu

59 Primary Characterization and In Vitro Antioxidant
Activities of Polysaccharides from Yam Peel \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 567
Na Liu, Liming Zhang, Kaibua Zhang, Aiying Tian and Ruichao Li

60 Optimization of Sample Preparation for the Metabolomics
of \textit{Bacillus licheniformis} by GC-MS \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 579
Hongbin Wang, Zhixin Chen, Jihan Yang, Yihan Liu and Fuping Lu
61 Characterization of Recombinant L-Amino Acid Deaminase of *Proteus mirabilis* ........................................... 589
Chenglin Zhang, Jia Feng, Xixian Xie, Qingyang Xu
and Ning Chen

62 Screening for Strains Capable of 13β-ethyl-4-gonene-3,
17-dione Biotransformation and Identification of Product ........ 597
Linlin Huang, Xiaoguang Liu, Yulan He, Pingping Wei,
Shuhong Mao and Fuping Lu

63 Extent and Pattern of DNA Cytosine Methylation Changes
Between Non-pollinated and Pollinated Ovaries
from *Cymbidium hybridium* ........................................... 607
Xiaoqiang Chen, Xiulan Li, Ning Sun and Wenqin Song

Part IV Progress of Biotechnology

64 The Application Status of Microbes in Salted Fish Processing . . . 619
Yan Yan Wu, Gang You and Lai Hao Li

65 Construction and Functional Analysis of Luciferase
Reporter Plasmids Containing ATM and ATR Gene
Promoters ................................................................. 627
Li Zheng, Xing-Hua Liao, Nan Wang, Hao Zhou,
Wen-Jian Ma and Tong-Cun Zhang

Erratum to: Characterization of Recombinant L-Amino
Acid Deaminase of *Proteus mirabilis* .............................. E1
Chenglin Zhang, Jia Feng, Xixian Xie, Qingyang Xu and Ning Chen