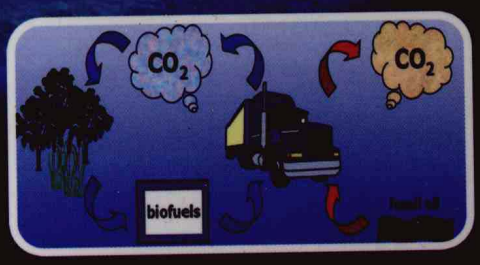
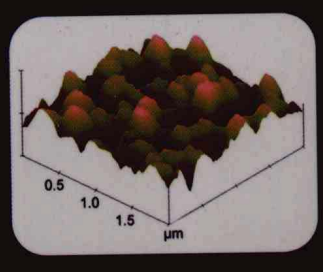
CHEMICAL ENGINEERING IN SUSTAINABLE DEVELOPMENT

Vol 2 Environment and Green Processing

Edited by
Xuhong QIAN and Jingping QU





Dalian University of Technology Press

Book of Abstracts of the 12th Asian Pacific Confederation of Chemical Engineering Congress

Aug 4~6, 2008, Dalian, China

CHEMICAL ENGINEERING IN SUSTAINABLE DEVELOPMENT

Vol 2 Environment and Green Processing

Edited by

Xuhong QIAN and Jingping QU

In cooperation with

Zhong XIN, Xuehu MA, Feng QIAN, Jie BAO, Li LI, Xuhong GUO, Haoquan HU, Shuguang LV, Xinwen GUO, Changsheng LIU, Dongfeng XUE, Jianhe XU, Qing YANG, Zhenmin CHENG, Mingzhai QI, Gaohong HE

Organizer

The Chemical Industry and Engineering Society of China

Contractors

East China University of Science and Technology

Dalian University of Technology

Dalian University of Technology Press

图书在版编目(CIP)数据

化学工程的可持续发展/钱旭红,曲景平主编. —大连:大连理工大学出版社,2008.7
ISBN 978-7-5611-4285-1

Ⅰ.化… Ⅱ.①钱…②曲… Ⅲ.化学工程-研究 Ⅳ.TQ02

中国版本图书馆 CIP 数据核字(2008)第 111353 号

大连理工大学出版社出版
地址:大连市软件园路 80 号 邮政编码:116023
发行:0411-84708842 邮购:0411-84703636 传真:0411-84701466
E-mail:dutp@dutp.cn URL:http://www.dutp.cn
大连图腾彩色印刷有限公司印刷 大连理工大学出版社发行

幅面尺寸:210mm×290mm 印张:25.75 字数:520 千字
2008 年 7 月第 1 版 2008 年 7 月第 1 次印刷

责任编辑:刘新彦 王颖鑫 责任校对:知 轩
封面设计:宋 蕾

ISBN 978-7-5611-4285-1 定 价:1580.00 元(共 5 册)

Book of Abstracts of the 12th Asian Pacific Confederation of Chemical Engineering Congress – Vol 2
Aug 4 ~ 6, 2008, Dalian, China
Edited by Xuhong Qian and Jingping Qu

Preface

This five-volume book contains the final abstracts of most of the papers presented at the **12th Asian Pacific Confederation of Chemical Engineering Congress** (APCChE2008) held in Dalian, China in August 4 ~6, 2008. Each volume contains approximately 400 abstracts from one or two themes. In addition, a proceeding of the APCChE2008 in a CD-ROM (containing all accepted full-length manuscripts by a large percentage of authors, the technical program, the author-program index and many more) has been prepared for distribution to all participants of APCChE2008.

APCChE2008 is the 12thin the series of Congresses on Chemical Engineering launched by the Asian Pacific Confederation of Chemical Engineering (APCChE) in 1979 in Jakarta, Indonesia. Since then, APCChE Congresses have been organized in Philippines (1981), Thailand (Bangkok, 1984), Singapore (1987), Malaysia (Kuala Lumpur, 1990), Australia (1993), China (Taibei,1996), Korea (Seoul, 1999), New Zealand (Christchurch, 2002), Japan (Kitakyushu, 2004) and Malaysia (Kuala Lumpur, 2006).

The objective of this biennial congress is to provide engineers, scientists, researchers, technologists, teachers and students from the member societies in 13 countries or areas in Asian Pacific region as well as the other parts of the whole world a platform to present their latest results, to interchange ideas, to make new friends and to establish new collaborations. The conference addresses the full spectrum of chemical engineering, including current trends and future needs. The focus of APCChE2008 is **Chemical Engineering in Sustainable Development** including six themes: (1) Clean Energy Technology; (2) Environment and Green Processing; (3) Materials Science and Engineering; (4) Biotechnology; (5) New Frontiers in Chemical Engineering; (6) Education for Chemical Engineers.

I would like to thank all the authors for submitting their abstracts and full papers. I thank the members of the Organizing Committee for their reviews, their advice during the selection process

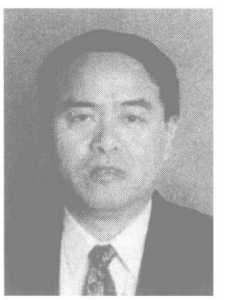
and the preparation of the technical program. Special thanks go to Prof Jingping Qu, Prof Zhong Xin, Prof Xuehu Ma, Prof Feng Qian, Prof Jie Bao, Prof Li Li, Prof Xuhong Guo, Prof Haoquan Hu, Prof Shuguang LV, Prof Xinwen Guo, Prof Changsheng Liu, Prof Dongfeng Xue, Prof Jianhe Xu, Prof Qing Yang, Prof Zhenmin Cheng, Prof Mingzhai Qi, Prof Gaohong He and the editors of Dalian University of Technology Press in getting abstracts ready for these books. Also, I would like to acknowledge all the contributors to APCChE2008.

I hope that these books of abstracts will serve as a valuable record of reference of the contributions made at APCChE2008.

Qian, Xuhong, Ph. D.
Chairman of the Executive Committee
President of Asian Pacific Confederation of Chemical Engineering
President of East China University of Science and Technology,
Professor of Bioorganic Chemistry and Engineering

Organizations

ADVISOR COMMITTEE



Chairman

Xianghong Cao

President of CIESC, Chief Engineer of China Petrochemical Corporation, Member of Chinese Academy of Engineering

Vice Chairman

Jinghai Li

Vice President, Member of Chinese Academy of Science(CAS)

Jinping Ou

President of Dalian University of Technology(DUT), Member of Chinese Academy of Engineering

Xiaofei Qu

Vice Mayor of Dalian

Members

Bingzhen Chen	Weiyang Fei	Musun Guo	Ying Hu
Yong Jin	Zhengming Li	Dadong Li	Wanzhen Lu
Bingquan Mao	Enze Min	Pingkai Ouyang	Yinchu Shen
Xingtian Shu	Jingkang Wang	Jiading Wang	Jiming Wang
Jinzong Yang	Shengli Yang	Guozong Yu	Qingtang Yuan
Quan Yuan	Weikang Yuan	Daoben Zhu	

INTERNATIONAL ADVISOR COMMITTEE

David Wood

Chair of the World Chemical Engineering Council Executive,
Emeritus Professor & Professorial Fellow,
Department of Chemical and Biomolecular Engineering, University of Melbourne, Australia

Zhanfeng Cui

Professor, Oxford University, UK

Guohua Hu

Professor at the Institut National Polytechnique de Lorraine (INPL),
Nancy, France, Membre de L'Institut Universitaire de France

Norman N Li

Member of National Academy of Engineering, USA;
NL Chemical Technology, Inc

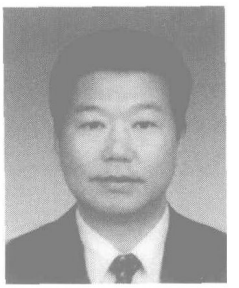
Otto Lin

CEO of China Nansha Technology Enterprises;
Senior Advisor to the President of Hong Kong University of Scientce & Technology

Philip W Lee

DuPont Crop Protection, USA

ACADEMIC COMMITTEE



Chairman

Xinhua Li

Vice President of CIESC,
Vice President of China National Petroleum Corporation

Vice Chairman

Xunfeng Liu

President of Shanghai Huayi Group Company

Xiaoshen Fan

Vice President of CIESC, Vice President of China National Chemical Corporation

Members

Prof. Jie Bao (China)
Prof. Suresh Bhatia (Australia)
Prof. Feng-Chih Chang (Taipei)
Prof. De Chen (Norway)
Prof. Zhenmin Cheng (China)
Prof. Zhanfeng Cui (UK)
Prof. Xinwen Guo (China)
Prof. Xuhong Guo (China)
Prof. Kazuichi Hayakawa (Japan)
Prof. Gaohong He (China)
Prof. Haoquan Hu (China)
Prof. Guo-Hua Hu (France)
Prof. Takashi Inoue (Japan)
Prof. Ming-Jer Lee (Taipei)
Prof. Kuangfei Lin (China)
Prof. Changsheng Liu (China)
Prof. Boping Liu (China)
Prof. Max Lu (Australia)
Prof. Xiaobing Lv (China)
Prof. Xuehu Ma (China)
Prof. Ashok Mulchandani (USA)
Prof. Toshio Nishi (Japan)
Prof. Say Leong Ong (Singapore)
Prof. Sunghoon Park (Korea)
Prof. Xiaojun Peng (China)
Prof. Mingzhai Qi (China)
Prof. Xuhong Qian (China)
Prof. Jieshan Qiu (China)
Prof. Jingping Qu (China)
Prof. Xie Quan (China)
Prof. Vivek V Ranade (India)
Prof. Xu Shen (China)
Prof. Chun-shan Song (USA)
Prof. Philippe A Tanguy (Canada)
Prof. Dongzhi Wei (China)
Prof. Gang Wei (Australia)
Prof. Nae-Lih Wu (Taipei)
Prof. Tiancun Xiao (UK)

Prof. Zhong Xin (China)
Prof. Dongfeng Xue (China)
Prof. Chunhua Yan (China)
Prof. Yuanyi Yang (China)
Prof. Qing Yang (China)
Prof. Wei-chi Ying (China)
Prof. Quan Yuan (China)
Prof. Shufen Zhang (China)
Prof. Zhibing Zhang (UK)

ORGANIZING COMMITTEE

Chairman

Qiyi Gong

Vice President and Secretary General of CIESC, Senior Engineer

Vice Chairman

Dinyi Hong

Secretary General of CIESC, Senior Engineer

Hongming Sun

Dalian PCIA

Members

Zhixia Fu

Vice Chief Engineer of China National Chemical Corporation,
Standing Council member of CIESC

Jie Hu

Chief Engineer of Chemical & Marketing Company of CNPC,
Standing Council member of CIESC

Xuteng Hu

Vice Secretary General of CIESC,
Vice President of Petrochemical Research Institute of CNPC

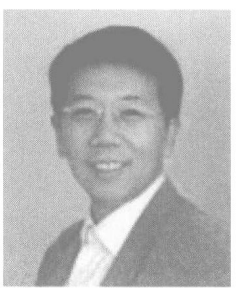
Zhong Xin

Dean of the School of Chemical Engineering, ECUST

Xuehu Ma

Head of Department,
School of Chemical Engineering, DUT, member of CIESC

EXECUTIVE COMMITTEE



Chairman

Xuhong Qian

President of APCChE,
Vice President of CIESC,
President of East China University of Science and Technology (ECUST)

Vice Chairman

Jingping Qu

Vice President of CIESC,

Dean of the School of Chemical Engineering, Dalian University of Technology

Secretary General

Zhong Xin

Dean of the School of Chemical Engineering,
East China University of Science and Technology (ECUST)

Vice Secretary General

Xuehu Ma

Head of Department, School of Chemical Engineering,
Dalian University of Technology

Members

Tao Bai	Zhengfang Cao	Ruihua Cheng	Ju Chu
Hongguang Dong	Jian Du	Chunhua Gu	Shui Guan
Xuhong Guo	Xinwen Guo	Chongheng He	Gaohong He
Haoquan Hu	Jiajun Jiao	Hao Jin	Lijun Jin
Zhong Lan	Chunzhong Li	Li Li	Yang Li
Boping Liu	Yanlai Liu	Xuewu Liu	Lianhe Lv
Yulu Ma	Xin Meng	Feng Qian	Yuanyuan Qu
Zhicong Shi	Zhongye Si	Li Sun	Wensong Tan
Dazhi Tan	Xiongyue Wang	Jin Wang	Zhonggang Wang
Jin Wang	Guangli Xiu	Jianhe Xu	Dongfeng Xue
Jun Yang	Qing Yang	Bangze Ye	Xiongfu Zhang
Xingui Zhou	Yian Zhu		

Book of Abstracts of the 12th Asian Pacific Confederation of Chemical Engineering Congress – Vol 2
Aug 4 ~ 6, 2008, Dalian, China
Edited by Xuhong Qian and Jingping Qu

TABLE OF CONTENTS