The 8th APCChE Congress
Asian Pacific Confederation of Chemical Engineering

Challenges Facing Chemical Engineering in the 21st Century

August 16-19, 1999
Seoul, Korea

APCChE 99
Thursday, August 19, 1999

ORAL SESSIONS

SESSION 1F : Topics on Materials Science I

9-1F-IL [Invited Lecture]
Materials Processing for Electronics – From Growth Rate to Morphology
Hiroshi Komiyama, The University of Tokyo, Japan

9-1F-01 Growth Chemistry and Interface Characterization of Single Crystal SiC on Modified Si Surface
Kee Suk Nahm, Kwang Chul Kim, Chan Il Park, Chonbuk National University, Korea

9-1F-02 Study on the Gasification Behavior of Carbonaceous Material by a Fixed-Point Observation with TEM
Takayuki Takarada, Kayoko Morishita, Gunma University, Japan

9-1F-03 Comparison of Tetrakis-Dimethyl-Amido-Titanium and Tetrakis-Diethyl-Amido-Titanium and Remote Plasma Titanium Nitride (TiN) Metal-Organic Chemical Vapor Deposition (MOCVD)
Ju-Young Yun, Shi-Woo Rhee, Pohang University of Science and Technology, Korea

SESSION 1G : Topics on Materials Science II

9-1G-IL [Invited Lecture]
Toughening of the Thermoplastic Modified Thermosets Having Morphology Spectrum
Y. S. Kim, H. S. Min, S. C. Kim, Korea Advanced Institute of Science and Technology, Korea

9-1G-01 Polymers Designed for Membrane Separation
Hidetoshi Kita, Yamaguchi University, Japan

9-1G-02 Surface Molecular Imprinted Polymers as a Novel Separation Tool
Masahiro Goto, Kazuya Uezu, Shintaro Furusaki, Kyushu University, Japan
SESSION 2F : Development of Catalytic Processes I

9-2F-01 Role of Water in the Catalytic Decomposition of Chlorinated Hydrocarbons over Cr-containing Catalysts
Dae-Chul Kim, Son-Ki Ihm,
Korea Advanced Institute of Science and Technology, Korea

9-2F-02 Liquid Phase Kinetics of Tertiary Butyl Alcohol Synthesis from Hydration of Isobutene over a Commercial Ion Exchange Resin Catalyst
M. R. Suboh, C. Zhang, A. A. Adesina, M. S. Wainwright,
University of New South Wales, Australia

9-2F-03 Oxygen Production Using BaO-BaO$_2$ Reaction Cycle
Changchun Jin, Takashi Suehiro, Tetsuro Ikekami, Akio Kodama, Motonobu Goto, Tsutomu Hirose, Kumamoto University, Japan

9-2F-04 The New Reaction Route for N-VINYL-2-Pyrrolidone over Acid-Base Bifunctional Catalyst
Pine-Sci Kuo, Chu-Chang Dai,
Industrial Technology Research Institute, Taiwan

9-2F-05 Low-Temperature CO Oxidation over a Heterogenized Wacker Catalyst: The Role of Copper Phase on Catalyst Stability
Eun Duck Park, Jae Sung Lee,
Pohang University of Science and Technology, Korea

SESSION 2G : Development of Catalytic Processes II

9-2G-01 Study on the Reaction Variables in a Fixed-bed Reactor for Oxidation of o-Xylene over V2O5/TiO2 Catalysts
Yeung Ho Park, Seung Jun Kim, Shin Choon Kang,
Hanyang University, Korea

9-2G-02 The Degradation of Polyvinyl Alcohol by Means of a Photo-Fenton Reaction
D. C. M. Ho, Po Lock Yue, J. F. Porter,
The Hong Kong University of Science and Technology, Hong Kong

9-2G-03 The Design Principles of Pd-only Catalysts for the Purification of Automobile Emissions
SESSION 2H : Development of Catalytic Processes III

9-2H-IL  [Invited Lecture]  
Catalyst Preparation with New Mesoporous Molecular Sieves  
Ryong Ryoo, Shinae Jun, Sang Hun Joo,  
Korea Advanced Institute of Science and Technology, Korea  
9-2H-01  Kinetics of Methanol Steam Reforming over Cu-Zn Catalysts  
Mee Sook Lim, Dong Hyun Kim,  
Kyungpook National University, Korea  
9-2H-02  A Novel Method for Improving the Performance of Porous Membrane Reactor Fed with Pure Reactant  
Azis Trianto, Takashi Fukushima, Takao Kokugan,  
Tokyo University of Agriculture and Technology, Japan  
9-2H-03  Urea from Underground Coal Gas  
Christopher J. Williamson, University of Canterbury, New Zealand  
9-2H-04  Functionalization and Grafting of Syndiotactic-Styrene/4-Methyl Styrene Copolymer  
Shu-Hua Chan, Huai-Mei Chou, Sheng-Te Yang, Li-Jiun Chen,  
Chi-Lan Li, Industrial Technology Research Institute, Taiwan

SESSION 3F : Waste Treatment and Utilization III

9-3F-01  Development of Bubble Column for Treatment of Wastewater Including Oil  
Yoshiyuki Bando, Takayuki Tanaka, Keiji Yasuda, Masaaki Nakamura,  
Nagoya University, Japan  
9-3F-02  Lubricating Oil Sludge and its Demulsification  
Guohua Chen, Po Lock Yue, Hong Kong University of Science and Technology, Hong Kong  
Gaoqiong He, Dalian University of Technology, Hong Kong  
9-3F-03  Pretreated Biomass of Marine Macroalgae as Low Cost High Efficiency Adsorbent for Heavy Metal Ions  
Qiming Yu, Pairat Kaewsarn, Jose T. Matheickal, Weitung Ma,  
Griffith University, Australia  
9-3F-04  Development of Biological Treatment Process for Heavy Metal Containing Industrial Wastewater Using Sulfate Reducing Bacterial Activity  
Ji-Won Yang, Sang-Pil Yeom,  
Korea Advanced Institute of Science and Technology, Korea  
9-3F-05  Catalytic Dechlorination of PCBs at Low Temperature  
Dong-Keun Lee, Eun-Suk Byun, Gyeongsang National University, Korea  
In-Cheol Cho, Kyoung Sang Nam-Do Provincial Government, Korea  
Sung-Woo Kim, Sam Hyeob Resource Development Co., Ltd., Korea
SESSION 3G : Waste Treatment and Utilization IV

9-3G-01 Biosorption of Copper(II) from Aqueous Solutions by Pre-treated Biomass of Marine Alga Padina SP.
Qiming Yu, Pairat Kaewsarn, Griffith University, Australia

9-3G-02 Environmental Crystallization in the Wastewater Treatment
Izumi Hirasawa, Waseda University, Japan

9-3G-03 Influence of Growth Rate on Biosorption of Heavy Metals by Nocardia Amarae
Dong Wook Kim, Korea Institute of Science and Technology, Korea
Daniel K. Cha, University of Delaware, USA
Yunchul Chung, Korea Institute of Science and Technology, Korea

9-3G-04 Production of Lime from Sludge in Water Treatment Plants
Ibrahim S. Al-Mutaz, King Saud University, Saudi Arabia
Sami O. A. Al-Yousef, Riyadh Water & Sewage Authority, Saudi Arabia

SESSION 3H : Waste Treatment and Utilization V

9-3H-IL [Invited Lecture]
Energy-efficient Catalysis in Renewable and Non-renewable Feedstocks
V. P. Shiralkar, National Chemical Laboratory (CSIR), India

9-3H-01 Effect of Structure Change on Drying Characteristics of Municipal Solid Waste
Yuji Tatemoto, Yoshiyuki Bando, Keiji Yasuda, Masaaki Nakamura, Nagoya University, Japan
Muneo Azegami, Prand Research Institute, Japan

9-3H-02 Oil Recovery and Raw Material Recycle Technologies by the Pyrolysis of Waste
SESSION 40F : Biomaterials and Bioprocesses

9-40F-01 The Effects of Surfactants on Chalcopyrite Bioleaching: Preliminary Results
Jinyu Tang, Ha Ming Ang, Curtin University of Technology, Australia
Helen R. Watling, Belinda J. Clark, CSIRO Minerals, Australia

9-40F-02 E. Coli Oxygen-Dependent nar Promoter System in the Fed-Batch Cultures for the Production of Recombinant β-galactosidase
Ho Nam Chang, Se Jong Han,
Korea Advanced Institute of Science and Technology, Korea
Jong Won Lee, Catholic University of Taegu-Hyosung, Korea

9-40F-03 Effects of the Toxic Compounds in Flue Gas on Growth of Highly CO₂ Tolerant Microalgae
Ju-No Lee, Jin-Suk Lee, Chul-Seung Shin, Soon-Chul Park, KIER, Korea
Seung-Wook Kim, Korea University, Korea

9-40F-05 Hydrodynamic Behavior in an External-Loop Inverse Fluidization Airlift Bioreactor
Shejiao Han, Reginald B. H. Tan, K. C. Loh, National University of Singapore, Singapore

SESSION 40H : Applications of Biotechnology

9-40H-IL [Invited Lecture]
Engineering for GMP Biopharmaceutical Plants
Byong Hyock Choi, Wayne Process Engineering, Ltd., Korea

9-40H-01 Repression of Baculovirus-Induced Insect Cell Apoptosis Using Silkworm Hemolymph
Won Jong Rhee, Eun Jeong Kim, Tai Hyun Park,
Seoul National University, Korea

9-40H-02 Recombinant Insect Larval Production Process is Optimized by Generating Fusions with Green Fluorescent Protein
Hyung Joon Cha, William E. Bentley, University of Maryland, USA

9-40H-03 Hydrolysis of Olive Oil in a Batch Reactor: Additive Effects on Lipase Activity
Huanfei Jia, H. M. Ang, P. Padmanabhan,
Curtin University of Technology, Australia

9-40H-04 Refolding of Denatured and Reduced Lysozyme with Cysteine/Cystine Red/Ox Solution in Diafiltration
Hidefumi Yoshii, Takeshi Furuta, Takahiro Yonehara, Daisuke Ito,
Tottori University, Japan
Pekka Linko, Helsinki University of Technology, Japan

(45)
SESSION 50F : Topics in Fluid Mechanics III

9-50F-01 Hydrodynamics during the Deposition of Langmuir-Blodgett Films
Liyan Zhang, M. P. Srinivasan,
National University of Singapore, Singapore

9-50F-02 Microstructure and Rheological Properties of Aqueous Cationic Surfactant Solution in the presence of Structure-Enhancing Additives
Won-Jong Kim, Seung-Man Yang,
Korea Advanced Institute of Science and Technology, Korea

9-50F-03 Diffusion and Partition Coefficients of Substrates in AOT Microemulsion-based Organogels
Kazuhito Nagayama, Akio Ueta,
Kochi National College of Technology, Japan
Masanao Imai, Toshifusa Doi, Nihon University, Japan

9-50F-04 Computational Fluid Dynamics for Predicting Mixing Behavior of Bakers' Yeast Fermentor
Thongchai Srinophakun, Kasetsart University, Thailand
Jessada J. Jitjaroenchai, KMUTT, Thailand

9-50F-05 Hydrodynamic Study of Mixing in the Combustion Chamber of a Secondary Reformer Using Acid-Alkali Cold Model
Herri Susanto, Suhartono, ITB, Indonesia

SESSION 50G : Heat and Mass Transfer

9-50G-01 Dissolution of CO₂ from CO₂ Drops Suspended in a Counter Flow of Water at High Pressure, Low Temperature Region – Effect of Hydrate Film on the Mass Transfer
Keiichi Ogasawara, Ho Teng, Akihiro Yamasaki,
National Institute of Materials and Chemical Research, Japan

9-50G-02 On the Use of Open Boundary Condition Method in the Numerical Simulation of Nonisothermal Viscoelastic Flow
Seung Joon Park, Seung Jong Lee, Seoul National University, Korea

9-50G-03 Unsteady Forced Convection Heat Transfer in Porous Medium
Wen-Tung Cheng, National Chung Hsing University, Taiwan
Hasiao-Tsung Lin, National Central University, Taiwan

9-50G-04 Design of a New Heterogeneous Reactor for Kinetic Studies of Semiconductor Photocatalysis using CFD
Vidya Niwas Khetawat, Ajay K. Ray,
National University of Singapore, Singapore

(46)
SESSION 500H: Powder Technology

9-500H-IL [Invited Lecture]  1671
Particulate Design for Drug Delivery System with Spherical Crystallization Technique
Yoshiaki Kawashima, Gifu Pharmaceutical University, Japan

9-500H-01 The Ultra-fine Grinding Mechanism of Inorganic Powders and Surface Modification in a Stirred Grinding Media Mill: Simulation on the Motion Balls in a Stirred Mill
Hyun Soo Kim, Woo Sik Choi, Pusan National University, Korea
Toshihiko Umekage, Shinichi Yuu, Kyushu Institute of Technology, Japan

9-500H-02 A Simple Method to Increase the Efficiency of Reverse Flow Cyclone
Liu Qi, Madhumita Bhowmick Ray, National University of Singapore, Singapore

9-500H-03 Synthesis of Ultra-fine TiO₂ Powder Using Thermal Plasma
Seung-Min Oh, Jeong-Gu Gong, Dong-Wha Park, Inha University, Korea

SESSION 60F: Fundamentals of Fluidization Engineering

9-60F-01 Flow Regime Transition in Three-Phase Fluidized Beds—An Overview
Sang Done Kim, Korea Advanced Institute of Science and Technology
Yong Kang, Chungnam National University, Korea
Dong Hyun Lee, University of British Columbia, Canada

9-60F-02 Transient Fluid Flow in the Surgical Cavity of Brain Tumors
Chee Seng Teo, Madhusudana Rao Suryadevara, Timothy Lee, Chi-Hwa Wang, National University of Singapore, Singapore

9-60F-03 Models for Minimum Liquid Fluidization Velocity of Gas-Liquid Fluidized Beds
D. H. Lee, N. Epstein, J. R. Grace, University of British Columbia, Canada

9-60F-04 Effect of Particle Size Distribution on Particle Entrainment Rate in a Gas Fluidized Bed
Jeong-Hoo Choi, Joon-Min Suh, Konkuk University, Korea

9-60F-05 Stochastic Analysis of Gas-Liquid-Solid Flow in Three-Phase Circulating Fluidized Beds
Yong J. Cho, P. S. Song, Sung H. Kim, Yong Kang, Chungnam National University, Korea
Sang D. Kim, Korea Advanced Institute of Science and Technology, Korea
SESSION 60G : Applications of Fluidization Engineering I

9-60G-01 Nonlinear Modeling of the Chaotic Dynamics in a Circulating Fluidized Bed by an Artificial Neural Network
Y. Nakajima, R. Kikuchi, K. Kuramoto A. Tsutsumi,
University of Tokyo, Japan
K. Otawara, Kureha Techno Eng. Co., Japan

9-60G-02 Particle Hold-up in the Two-Fluidized Reactor System with Two Loopseals
Chang-Keun Yi, Sung-Ho Cho, Dal-Hee Bae, Dowon Shun,
Gyoung-Tae Jin, Jae-Ek Son,
Korea Institute of Energy Research, Korea

9-60G-03 Efficiency and Agglomeration of Powder Coating of Fluidizing Particles in Circulating Fluidized Bed
Hiroyuki Kage, Mitsunaga Dohzaki, Hironao Ogura, Yoshizo Matsuno,
Kyushu Institute of Technology, Japan

SESSION 60H : Applications of Fluidization Engineering II

9-60H-IL [Invited Lecture]
Fluidization of Cohesive Powders
Masayuki Horio, Tokyo University of Agriculture & Technology, Japan

9-60H-01 Fluidised Bed Production of High Quality Hot Briquetted Iron for Steelmaking
Allon D. Brent, BHP HBI, Australia
Peter L. J. Mayfield, Thomas A. Honeyands, BHP CMRP, Australia

9-60H-02 The Sedimentation of an Aggregate and a Fractal Floc
Heng-Kwong Tsao, C.-Y. Tseng, S.-C. Wang,
National Central University Taiwan, Taiwan

9-60H-03 Effects of Particle Properties on Hydrodynamic Behaviors and Heat Transfer Characteristics in Pulsated Fluidized Bed
Akira Nishimura, Seiichi Deguchi, Hitoki Matsuda, Noriyuki Kobayashi,
Masanobu Hasatani, Nagoya University, Japan
Arun S. Mujumdar, McGill University, Canada

9-60H-04 Effects of Pressure on Combustion Characteristics of Coal
Yongseung Yun, Gae Bong Lee,
Institute for Advanced Engineering, Korea

(48)
SESSION 7F : Solid-Fluid Separation II

9-7F-01  Optical Resolution of Amino Acids By Ultrafiltration Using Modified Cyclodextrins
M. Arif Yudiarto, Yukiko Yoshizawa, Takao Kokugan,
Tokyo University of Agriculture and Technology, Japan

9-7F-02  Numerical Simulation of a Kinetically Controlled PSA Bulk Separation Process based on a Bidisperse Pore Diffusion Model
R. Gupta, S. Farooq, National University of Singapore, Singapore

9-7F-03  Optimization of Start-up Operating Conditions in RPSA
Daeho Ko, Il Moon, Yonsei University, Korea
Min Oh, Taegon National University of Technology, Korea

9-7F-04  Characterization of Ethanol-Pulp from Oil-Palm Empty Fruit Bunches
Herri Susanto, ITB, Indonesia
Wieke Pratiwi,
Institute for Research and Development of Cellulose Industry, Indonesia

9-7F-05  Effect of Salt on Temperature-Swing Adsorption of Nonionic Surfactant with PVMEG
Kazuaki Yamagiwa, Masanori Yoshida, Akira Ohkawa,
Niigata University, Japan
Hisao Ichijo,
National Institute of Materials and Chemical Research, Japan

SESSION 7G : Solid-Fluid Separation III

9-7G-01  Deposition of Colloidal Particles in Randomly Packed Fibrous Media
Yongcheng Li, C.-W. Park, University of Florida, USA

9-7G-02  Collection Performance of Medium Performance Air Filter Consisting of Binary Fibers under Dust Loaded Condition
T. Sakano, N. Namiki, H. Emi, Y. Otani, Kanazawa University, Japan

9-7G-03  Adsorbents for Light Alkane/Alkene Separation
Sang-Sup Han, Jong-Nam Kim, Soon-Haeng Cho,
Korea Institute of Energy Research, Korea
N. V. Choudary, Prakash Kumar, S.G.T. Bhat,
Indian Petrochemicals Corporation Ltd., India

9-7G-04  A Theoretical Study on Interaction between AgNO3-Silica Gel and Adsorbed Molecules by Using AB Initio MO Method
Tetsuo Suzuki, Hajime Tamon, Morio Okazaki,
Kyoto University, Japan

(49)
SESSION 7H : Solid-Fluid Separation IV

9-7H-IL [Invited Lecture] 1785
Recent EOS-based Equilibrium Models for Separation Processes
Chul Soo Lee, B.H. Park, J. W. Kang, Korea University, Korea
K. P. Yoo, Sogang University, Korea

9-7H-01 Sorption Kinetics for the Removal of Copper and Zinc from Effluents 1789
Using Bone Char
C. W. Cheung, J. F. Porter, G. McKay,
Hong Kong University of Science and Technology, Hong Kong

9-7H-02 Adsorption of Maltooligosaccharides from Aqueous Solution onto 1793
Activated Carbon
Jae Wook Lee, Heung Joe Jung, Seonam University, Korea
Il Shik Moon, Sunchon National University, Korea
Hee Moon, Chonnam National University, Korea

9-7H-03 Adsorption Kinetics of Hydrocarbons in a Large Heterogeneous 1797
Microporous Particle
Shizhang Qiao, Xijun Hu, Hong Kong University of Science
and Technology, Hong Kong

9-7H-04 Separation of The Ni2+ and Cr6+ Ions with Application of the Zeolite 1801
from Type NaA
Blagica Cekova, Maria Curie-Sklodovska, Macedonia

(50)
POSTER SESSIONS
Thin Solid Films/Novel Materials/Topics on Materials Science
(9-P3-1 ~ 9-P3-51)

9-P3-1 Preparation of Sodium Silicate from Clay
Mi Sun Cha, Kyun Young Park, Kongju National University, Korea

9-P3-2 Flame Synthesis of Silica Nanoparticles from Tetraethoxysilane Vapor
Hee Dong Jang, Korea Institute of Geology, Mining and Materials, Korea

9-P3-3 Dynamics of Hydrogen Trapped in Diamond Lattice - A Direct
Molecular Orbital Dynamics Approach
Akira Shimizu, Micho Inagaki, Hiroto Tachikawa,
Hokkaido University, Japan

9-P3-4 Enhancement of Hydrophobicity by PECVD Thin Film Coating on
Metal Surfaces
Hyun So, Young Chai Kim, Hanyang University, Korea

9-P3-5 Preparation of Epoxy Resin/Acrylic Composite Latices by
Miniemulsion Polymerization Method
H. Kawahara, T. Gotoh, K. Ohnishi,
Dainippon Ink & Chemicals Inc., Japan
H. Kage, Y. Matsuno, Kyushu Institute of Technology, Japan

9-P3-6 Phase Behavior and Properties of Cationic/Anionic Mixed
Surfactant Systems
Kye-Hong Kang, Kyung-Hee Lim, Chung-Ang University, Korea

9-P3-7 Structural and Optical Characterization of Thick GaN Film Grown
by a Direct Reaction of Metal Ga with NH₃ in CVD Reactor
Kee Suk Nahm, Seung Hyun Yang, Sang Hyun Ahn,
Chonbuk National University, Korea

9-P3-8 Synthesis and Characterization of LiMn₂O₄ Cathode Materials
by Adiphic Acid-Assisted Sol-Gel Method
Kee Suk Nahm, Sang Ho Park, Yun Sung Lee,
Chonbuk National University, Korea
Yeong Seok Yang, Woo Suk University, Korea

9-P3-9 Effect of Liquid Mixing on Decomposition Performance by Ultrasound
Keiji Yasuda, Misako Tachi, Ryo Tanigawara, Yoshiyuki Bando,
Masaaki Nakamura, Nagoya University, Japan
9-P3-10 Performance of Silica Slurries with Silica Particles Grown by Sol-Gel Method
Sun Hyuck Bae, Do Hyun Kim,
Korea Advanced Institute of Science and Technology, Korea

9-P3-11 Simulation of an Inductively Coupled Ar-Plasma Using Two-Dimensional Continuum Model
Dong Ho Kim, Do Hyun Kim,
Korea Advanced Institute of Science and Technology, Korea
Won Young Chung, Samsung Electronics Co., LTD., Korea

9-P3-12 Temperature Control of an RTP System Using a Model Predictive Control Technique with Iterative Learning
Kwang Soon Lee, Jinho Lee, Insik Chin, Jinhoon Choi,
Sogang University, Korea

9-P3-13 Effect of Ultrasound on Recrystallization of Nitro Compound
Ho- Yeon Lee, Kee-Kahb Koo, Sogang University, Korea
Gio-Bin Lim, The University of Suwon, Korea
Won-Bok Jeong, Sun-Hwan Kim, Hanwha Corporation, Korea
Hyoun-Soo Kim, Bang-Sam Park,
Agency for Defence Development, Korea

9-P3-14 Crystal Growth of Calcium Sulfate Dihydrate on Enamel Surface
Hee-Chun Eun, Kee-Kahb Koo, Sogang University, Korea
Ho-Nam Lim, Kyung-Hee University, Korea

9-P3-15 Application of Quaternary Ammonium Salts in the Synthesis of Polymers Containing Silicone
Jeong-Yeol Moon, Han-Jin Jang, Kyung-Hoon Kim, Sek-Eun Na,
Dae Won Park, Jin-Kook Lee, Pusan National University, Korea

9-P3-16 Electrochemical Surface Treatment of Carbon Fibers to Enhance Interfacial Adhesion
Mun-Han Kim, Soo-Jin Park, Jae-Rock Lee,
Korea Research Institute of Chemical Technology, Korea

9-P3-17 Properties of Carbon-Carbon Composites Produced in One Liquid Impregnation Manufacturing Step
Soo-Jin Park, Min-Seok Cho, Jae-Rock Lee,
Korea Research Institute of Chemical Technology, Korea

9-P3-18 Adsorption Characteristics of Carbon Fiber-Reinforced Matrix Composites
Soo-Jin Park, Ki-Dong Kim,
Korea Research Institute of Chemical Technology, Korea
<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-P3-19</td>
<td>Electrochemical Surface Treatment of Activated Carbons on Adsorption Surface Chemistry</td>
<td>Soo-Jin Park, Ki-Dong Kim, Korea Research Institute of Chemical Technology, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-20</td>
<td>Growth Mechanism of Silica Particle and its Growth Rate in Metastable SiO₂ Supersaturation</td>
<td>Kyung-Soo Kim, Woo-Sik Kim, Kyunghee University, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-21</td>
<td>Variation of Hydrolysis/Condensation Rates of TEOS with Reaction Conditions and its Influence on Particle Size of Silica in Sol-Gel Precipitation</td>
<td>Kyung-Soo Kim, Woo-Sik Kim, Kyunghee University, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-22</td>
<td>Growth Kinetic Parameters of Yttrium Oxalate Crystals in Two-Step Growth Model</td>
<td>Joon-Soo Kim, Korea Institute of Geology, Mining and Minerals, Korea Min-Hyun Sung, Woo-Sik Kim, Kyunghee University, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-23</td>
<td>Effect of Fabrication Condition of Gas Diffusion Electrodes for Reduction of Carbon Dioxide</td>
<td>Keyoung-Ran Lee, Jea Keun Lee, Pukyong National University, Korea Jun Heok Lim, Hai Soo Chun, Korea University, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-24</td>
<td>A New Model of Impedance of Porous Electrodes Considering Frequency Dispersion by Pore Size Distribution</td>
<td>Hyun-Kon Song, Hee-Young Hwang, Kun-Hong Lee, Pohang University of Science and Technology, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-25</td>
<td>Preparation and Electrical Properties of BST Thin Films Deposited by Liquid Source Misted Chemical Deposition(LSMCD)</td>
<td>Hyun Jin Chung, Jae Hyong Choi, Jeong Young Lee, Seong Ihl Woo, Korea Advanced Institute of Science and Technology, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-26</td>
<td>Synthesis of Silicalite-1 Film on the Quartz Surface Using the Vapor Phase Transport Method</td>
<td>Yung-Hwan Kim, Sung-Sun Hong, Chungbuk National University, Korea Man-Hoe Kim, Air Force Academy, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-27</td>
<td>Advanced Microelectronic Packaging Materials</td>
<td>Jong-Woo Bae, Wonho Kim, Jung-Eun Shin, Suk-Hyeon Cho, Yong-Woo Hong, Pusan National University, Korea</td>
<td></td>
</tr>
<tr>
<td>9-P3-28</td>
<td>Formation of Anisotropic Membrane Structure via TIPS Process</td>
<td>Hideto Matsuyama, Kyoto Institute of Technology, Japan Masuo Yuasa, Yoshiro Kitamura, Okayama University, Japan Douglas R. Lloyd, University of Texas at Austin, USA</td>
<td></td>
</tr>
<tr>
<td>Paper Number</td>
<td>Title</td>
<td>Authors</td>
<td>Pages</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>9-P3-29</td>
<td>Volatile Etching Characteristics of Platinum in Cl₂ /CO Plasmas</td>
<td>Jin Hong Kim, Seong Ihl Woo, Korea Advanced Institute of Science and Technology, Korea</td>
<td>1917</td>
</tr>
<tr>
<td>9-P3-30</td>
<td>Adsorption on Mesoporous Molecular Sieves Prepared from Fluorosilicon</td>
<td>Soon-Yong Jeong, Jeong-Kwon Suh, Hangkyo Jin, Jung-Min Lee, Korea Research Institute of Chemical Technology, Korea</td>
<td>1921</td>
</tr>
<tr>
<td>9-P3-31</td>
<td>Theoretical and Experimental Analysis in the Drying Process of Thin Polyimide Films</td>
<td>Kwang Seung Park, Dukjoon Kim, Sung Kyun Kwan University, Korea</td>
<td>1925</td>
</tr>
<tr>
<td>9-P3-32</td>
<td>Aging Behavior of Metal Oxide Aerogels</td>
<td>Dong Jin Suh, Tae-Jin Park, Korea Institute of Science and Technology, Korea</td>
<td>1929</td>
</tr>
<tr>
<td>9-P3-33</td>
<td>Size Dependant Trapped Location of Dust inside Plasma Processing Chamber</td>
<td>Heon Chang Kim, Vasilios I. Manousiouthakis, University of California, USA</td>
<td>1933</td>
</tr>
<tr>
<td>9-P3-34</td>
<td>In Situ FTIR Studies on Surface Dynamic Mechanism of Silica Gel's Thermo-Activation Process</td>
<td>Boping Liu, Xiaohong Ren, Yongrong Yang, Shunxi Rong, Zhejiang University, China</td>
<td>1937</td>
</tr>
<tr>
<td>9-P3-35</td>
<td>Pore Characteristic of γ-Alumina Prepared from Amorphous Alumina</td>
<td>Hyoung-Shin Ko, Jeong-Kwon Suh, Byung-Ki Park, Soon-Yong Jung, Jung-Min Lee, Korea Research Institute of Chemical Technology, Korea</td>
<td>1941</td>
</tr>
<tr>
<td>9-P3-36</td>
<td>Hydration Reaction on the Crystalline Layered Sodium Silicate</td>
<td>Jong-An Kim, Jeong-Kwon Suh, Soon-Yong Jeong, Jung-Min Lee, Korea Research Institute of Chemical Technology, Korea</td>
<td>1945</td>
</tr>
<tr>
<td>9-P3-37</td>
<td>Study on Hydrothermal Stability of Mesoporous Molecular Sieve Synthesized from Fluorosilicon Compounds</td>
<td>Ho-Seong Jeong, Soon-Yong Jeong, Hang-Kyo Jin, Jeong-Kwon Suh, Jung-Min Lee, Korea Research Institute of Chemical Technology, Korea</td>
<td>1949</td>
</tr>
<tr>
<td>9-P3-38</td>
<td>Mesoporous Silica Preparation as Adsorbents for Cu Ion Removal</td>
<td>Hyunjoo Lee, Jongheop Yi, Seoul National University, Korea</td>
<td>1953</td>
</tr>
</tbody>
</table>
9-P3-39 Preparation of Sol-Gel Derived Ceramic Hollow Sphere 1957
Soonwoo Chah, Jongheop Yi, Seoul National University, Korea

9-P3-40 A Study of the Correlation between Organic Matrices and 1961
Nanocomposite Materials in Oyster Shell Formation
Cheong-Song Choi, Yong-Wan Kim, Sogang University, Korea

9-P3-41 On the Deformation of Oyster Shell 1965
Yong-Wan Kim, Cheong-Song Choi, Sogang University, Korea

9-P3-42 Preparation of Polyetherimide (PEI) Gas Separation Hollow Fibre 1969
Membranes: Effect of Spinning Conditions
Suxia Liu, W. K. Teo, National University of Singapore, Singapore

9-P3-43 Selective Dry Etching of GaAs/AlGaAs/InGaP and InN/GaN/AlN 1973
Systems in ICI- and IBr-Based Inductively Coupled Plasmas
Y. B. Hahn, Chonbuk National University, Korea
D. C. Hays, K. B. Jung, S. J. Pearton, University of Florida, USA

9-P3-44 Synthesis of Porous Materials Templated from the Close-packed 1977
Surfactant Nano-Tubular Structure
Shinsuke Nagamine, Ken-ichi Kurumada, Masataka Tanigaki,
Kyoto University, Japan
Anchaleeporn Waritswat Lothongkum,
King Mongkut's Institute of Technology, Japan

9-P3-45 The Fabrication of Resistance Temperature Detector via Photolithography 1981
Jikwang Kim, Dongkyu Lim, Jongkak Won, Jongsung Kim,
Younghwa Shin, Kyungwon University, Korea

9-P3-46 Characterization and Activity Test of Metal-Aluminate Catalysts for 1985
Nitric Oxide Abatement
Tae-Won Kim, Hyoung-Lim Ko, Jae-Hyung Kim, Kyung-Lim Kim,
Yonsei University, Korea

9-P3-47 Photo-Alignment of Liquid Crystal on Newly Synthesized 1989
Photopolymer with 4-Fluorocinnamate Side Chain
Jun-Young Kim, Tae-Ho Kim, Sung Kyun Kwan University, Korea

9-P3-48 A Study on the Selective Hydrogenation of 1,3-Butadiene over 1993
Pd-Li/SiO₂ Catalysts
Min Kang, Min Woo Song, Jae-Hyung Kim, Kyung-Lim Kim,
Yonsei University, Korea
9-P3-49 Preparation of Ceramic Thin Films using Self-Assembled Arrays
Gyoujin Cho, Myungwon Park, Il-Shik Moon,
Sunchon National University, Korea
Jae-Suk Lee, Kwangju Institute of Science and Technology, Korea
Yong-Gun Shul, Yonsei University, Korea
Younghyeon Cho, Korea Atomic Energy Research Institute, Korea

9-P3-50 Preparation and Characterization of Ceramic-Polypyrrole
Core-Shell Nanocomposite Through Self-Assembled Arrays
Gyoujin Cho, Chayeon Seo, Sunchon National University, Korea
Jae-Suk Lee, Kwangju Institute of Science and Technology, Korea
Yong-Gun Shul, Yonsei University, Korea

9-P3-51 Properties of Non-Circular Carbon Fibers with SIC Films
Prepared by CVD
Young-Seok Lee, Jun-Ho Kim, Sunchon National University, Korea
Bo Sung Rhee, Chungnam National University, Korea

Powder Technology (9-P3-52 ~ 9-P3-57)

9-P3-52 Control of Crystal Size Distribution by the Impinging Jets
Crystallization Technique
Chuck C. Wei, National Taipei University of Technology, Taiwan

9-P3-53 Transient Heating of Coal Particles Undergoing Pyrolysis at
Various Boundary Conditions
Eun-Seok Song, Sung-Chul Yi, Hanyang University, Korea

9-P3-54 Precipitation of Titanium Complexes and Their Conversion to
fine BaTiO$_3$ Particles by the Hydrothermal Reaction
Sang-Kyoon Lee, Guang-Jin Choi, KyungJa Woo, Young-Dae Kim,
Sang-Jun Sim, Young-Sang Cho,
Korea Institute of Science and Technology, Korea
Kee-Khab Koo, Sogang University, Korea

9-P3-55 Preparation of Ultra-fine Alumina Powders by D.C. Plasma Jet
Seung-Min Oh, Dong-Wha Park, Inha Univeristy, Korea

9-P3-56 Study on Mixing Process and Mixing Performance in a Batch Double-
Blade Kneader Mixer Using Image Analysis for Wet Particle System
Mitsuo Kamiwano, Meguru Kaminoyama, Kazuhiko Nishi,
Yokohama National University, Japan
Yasuo Suzuki, JGC Corporation, Japan

9-P3-57 Rough Shape Characterization for Particle Contours by
the Coordinate Detection Set-function with Fourier Analysis
T. Shibata, K. Arahori, T. Tsuji, O. Uemaki, H. Itoh, K. Shino hara,
Hokkaido University, Japan
T. Uchiyama, M. Otani, Hokkaido Industrial Research Institute, Japan

(56)
<table>
<thead>
<tr>
<th>Paper</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-P3-58</td>
<td>Excess Molar Enthalpies of Propylene Carbonate+Alcohol Mixtures at 298.15 and 323.15K</td>
</tr>
<tr>
<td>9-P3-59</td>
<td>Densities and V - L Equilibria for Carbon Dioxide and Citrus Oil Components</td>
</tr>
<tr>
<td>9-P3-60</td>
<td>Synthesis of Ultraporous Organic RF Aerogel</td>
</tr>
<tr>
<td>9-P3-61</td>
<td>Vapor-Liquid Equilibria of the Water+1,3-Propanediol and Water+1,3-Propanediol+Lithium Bromide Systems</td>
</tr>
<tr>
<td>9-P3-62</td>
<td>Calculations for Vapor-Liquid Equilibria in LNG Storage Tank Operating under Several Conditions</td>
</tr>
<tr>
<td>9-P3-63</td>
<td>Partitioning of Hydrophilic Proteins in Triton X-114-based Aqueous Two-Phase System</td>
</tr>
<tr>
<td>9-P3-64</td>
<td>Development of Thermophysical Database in Korea University</td>
</tr>
<tr>
<td>9-P3-65</td>
<td>Measurement and Prediction of Carbon Dioxide-Hydrate Formation in Aqueous Electrolyte Solution</td>
</tr>
<tr>
<td>9-P3-66</td>
<td>Development of the Semi-empirical Equation of State for Square-Well Fluid Based on the Statistical Associating Fluid Theory (SAFT)</td>
</tr>
</tbody>
</table>
Fundamentals of Fluidization Engineering/Applications of Fluidization Engineering (9-P3-67 ~ 9-P3-82)

9-P3-67 A New Mathematical Modeling Method for Fluid Catalytic Cracking Riser Reactors
Chunming Xu, Xinguo Chen, Jinsen Gao, University of Petroleum, China

9-P3-68 Effects of Packing Particle Properties on Liquid Flow Behaviors in Trickle Bed with Non-Uniform Packed Structure
Meisen Li, Yoshiyuki Bando, Keiji Yasuda, Masaaki Nakamura, Nagoya University, Japan

9-P3-69 Slug Characteristics in a Gas Fluidized Bed
Ho-Jung Ryu, Jeong-Hoo Choi, Konkuk University, Korea

9-P3-70 Fluidization of Ultrafine Particles with High G
Satoru Matsuda, Hiroyuki Hatano, National Institute for Resources & Environment, Japan
Koji Kuramoto, Atsushi Tsutsumi, The University of Tokyo, Japan

9-P3-71 Heat Transfer Characteristics in Liquid Drop Columns
Jun S. Kim, Kwang J. Woo, Yong Kang, Chungnam National University, Korea
Sang D. Kim, Korea Advanced Institute of Science and Technology, Korea

9-P3-72 Characterization of Pressure Signals in a Bubble Column by Wavelet Transform
S. H. Park, S. D. Kim, Korea Advanced Institute of Science and Technology, Korea
Y. Kang, Y. J. Cho, Chungnam National University, Korea
L. T. Fan, Kansas State University, USA

9-P3-73 Incineration Characteristics of Dye Sludge in a Fluidized Bed Incinerator
Jea-Keun Lee, Jae-Hoi Gu, Mi-Ran Kim, Pukyong National University, Korea
Hai-Soo Chun, Korea University, Korea

9-P3-74 Hydrodynamic Characteristics of Granules from Agitation Fluidized Bed Granulator(AFBG)
Jaehyeon Park, Jaehun Kim, Keun-Hee Han, Gyoung-Tae Jin, Jae-Ek Son, Korea Institute of Energy Research, Korea

9-P3-75 A Performance Study of Overflow and Underflow Standpipe in a Fluidized Bed
Ji Min Kim, Gui Young Han, Sungkyunkwan University, Korea
Chang Keun Yi, Korea Institute of Energy Research, Korea
9-P3-76 Selective Catalytic Reduction over CuO/γ-Al₂O₃ in a Fluidized Bed Reactor
Sang Mun Jeong, Sang Done Kim, Korea Advanced Institute of Science and Technology, Korea
Kyung Seun Yoo, Kwangwoon University, Korea

9-P3-77 A Study on the Fixation of Gaseous Cesium using Fly Ash Filter
Jong Ho Kim, Jin Myeoung Shin, Jang Jin Park, Myung Seung Yang, Kwan Sik Chun, Korea Atomic Energy Research Institute, Korea

9-P3-78 Attrition Characteristics of Alumina Catalyst for Fluidized Bed Incineration
Yeong-Seong Park, Han-Soo Kim, Taejon University, Korea
Do W. Sun, Kwang-sup Song, Sung-Kyu Kang, Korea Institute of Energy Research, Korea

9-P3-79 Removal and Recovery of Copper-Cyanide Complexes in a Semi-fluidized Ion Exchanger Bed
Seung Jai Kim, Kyung Ran Hwang, Jin Hwan Kim, Sung Yong Cho, Chonnam National University, Korea

9-P3-80 Characteristics of Fluidization in a Fluidized Bed Combustor during the Process of Granulation
Wong Seog Cha, Kunsan National University, Korea
Sung Chang Hong, Kyonggi University, Korea
Kwang Jung Oh, Pusan National University, Korea

9-P3-81 Combined DeSOx/DeNOx Reactions on a Natural Manganese Ore in a Fluidized Bed Reactor
Tae Sung Park, Dong Sup Doh, Korea University, Korea
Sung Chang Hong, Kyonggi University, Korea

9-P3-82 The Wall-to-Bed Heat Transfer in Turbulent Fluidized Beds
Ming-Chang Shou, Lii-ping Leu, National Taiwan University, Taiwan

Chemical Process Modeling and Simulation/Chemical Process Safety/Chemical Process Control and Operation (9-P3-83 ~ 9-P3-86)

9-P3-83 Nonlinear Model Predictive Control of a Continuous Styrene Polymerization Reactor Using Polynomial ARMA Model
Chang-Keun Oh, Sang-Seop Na, Hyun-Ku Rhee, Seoul National University, Korea

9-P3-84 Development of a Temporal Logic for the Automated Operating Procedure Synthesis in Chemical Plants
Bo-Kyeng Hou, Kyu-Suk Hwang, Pusan National University, Korea
Dongil Shin, En Sup Yoon, Seoul National University, Korea
9-P3-85 Generalized Two-Step Method for Molecular Weight control in a Batch Polymerization Reactor
Hyung-Jun Rho, Hyun-Ku Rhee, Seoul National University, Korea

9-P3-86 Optimal Reaction Conditions for a PET Process
Kyung-Su Ha, Hyun-Ku Rhee, Seoul National University, Korea

Topics in Fluid Mechanics/Heat and Mass Transfer (9-P3-87 ~ 9-P3-96)

9-P3-87 Facilitated Transport of Sodium Phenolate through Supported Liquid Membrane
Sang-Wook Park, Gun-Woo Kim, In-Joe Sohn, Christiawaty Ferania Kaseger, Pusan National University, Korea

9-P3-88 Emulsification of Low-Viscosity Liquids with Three Different Types of Motionless Mixer
Tatsumi Yamamoto, Hidehiro Kumazawa, Toyama University, Japan

9-P3-89 Analysis of the Transfer Phenomena of Naturally Smoldering Cigarettes-Evaporation-Pyrolysis Processes
Sung-Jae Jung, Sung-Chul Yi, Sei-Ki Moon, Hanyang University, Korea

9-P3-90 Theory and Numerical Simulation of Impurity Trapping in Crystal Layer Grown from Melt
Keisuke Fukui, Himeji Institute of Technology, Japan

9-P3-91 The Formation of the Secondary Particles on Sodium Fluoride Crystals
Hong-Ju Kim, Woo-Sik Kim, Kyunghee University, Korea

9-P3-92 Group- Contribution Estimation for the Viscosities of Organic Liquids
Chein-Hsiun Tu, Hsien-Chih Hsu, Providence University, Taiwan

9-P3-93 Mixing Phenomena in a Two-Layer Fluid with or without a Turbulent Patch
Eun Sook Cho, Hyo Kim, The University of Seoul, Korea

9-P3-94 The Study of Particle Distribution in Three Phase Mixing System
Ruey-Chi Hsu, Wei-Jyh Cheng, Chang Gung University, Taiwan

9-P3-95 A Study on the Squeezing Flow of ER Fluids Using Parallel Processing
Do Hoon Kim, Seung Jong Lee, Seoul National University, Korea
Sang Hyon Chu, NASA Langley Research Center, USA
Kyung Hyun Ahn, Cheil Industries Inc., Korea

9-P3-96 Effect of Adverse Pressure Gradient on Slug Flow in Air Lift Pumps
D. Venkatanarasaiyah, A. Venkata Ramayya, Vellore Engineering College, India