

BCREC

ISSN 1978-2993

Bulletin of Chemical Reaction Engineering & Catalysis

Volume 4, Number 1, Year 2009, 14 June 2009

Available online at: <http://bcrec.undip.ac.id/>

Department of Chemical Engineering,
DIPONEGORO UNIVERSITY

Masyarakat Katalisis Indonesia –
Indonesian Catalyst Society (MKICS)



Bull. Chem. React. Eng. Catal.	Vol. 4	No. 1	1– 36	Semarang June 2009	ISSN 1978-2993
-----------------------------------	--------	-------	-------	-----------------------	-------------------



AIMS AND SCOPE

BULLETIN OF CHEMICAL REACTION ENGINEERING and CATALYSIS (ISSN 1978-2993) provides a forum for publishing the novel technology related to chemical reaction engineering and catalysis engineering.

Scientific articles dealing with chemical reaction engineering, catalysis engineering, catalyst characterization, novel innovation of chemical reactor, etc. are particularly welcome. The bulletin encompasses research articles, original research report, review articles, short communications, and scientific commentaries in chemical reaction engineering and catalysis, including: fundamental of catalysis, fundamental of chemical reaction engineering, chemistry of catalyst, applied chemical reaction engineering, applied catalysis, applied bio-catalysis, applied bio-reactor, chemical reactor design, catalyst regeneration, and industrial practice of catalysis and chemical reactor engineering.

The article can be submitted electronically in MS Word/OpenOffice file to Editorial email (bcrec@undip.ac.id). Please read the author guidelines for the manuscript submission.

ABSTRACTING & INDEXING

Bulletin of Chemical Reaction Engineering and Catalysis (BCREC) covered by following services:

- GOOGLE SCHOLAR (<http://scholar.google.com>)
- EPRINTS UNDIP (<http://eprints.undip.ac.id>)
- DIRECTORY OF OPEN ACCESS JOURNAL (DOAJ) (<http://www.doaj.org>)
- GENEVA FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH (http://www.gfmer.ch/Medical_journals/Biochemistry_chemistry_physics.htm)
- DMOZ OPEN DIRECTORY PROJECT (<http://www.dmoz.org/Science/Chemistry/Publications/Journals/>)
- RESEARCHGATE - SCIENTIFIC NETWORK (<https://www.researchgate.net/application.Index.html>)
- SOCOLAR, PR China (<http://www.socolar.com>)
- NCSU LIBRARIES, (<http://www.lib.ncsu.edu/journals/browse.php?search=b&page=116>)
- JOURNAL FINDER, THE UNIVERSITY OF NORTH CAROLINA (<http://journalfinder.wtcox.com/uncg/search-subj.asp?subj=7&lastrec=200&sortord=ASC>)
- ALUMNI E-LIBRARY (<http://sunzi1.lib.hku.hk/ER/detail/cof/4196022>)
- HINDU WEBSITE SEARCH - SCIENCE CHEMISTRY PUBLICATIONS JOURNALS (<http://www.hinduwebsite.com/utilities/webDir/webDir.asp?Science/Chemistry/Publications/Journals>)

PUBLICATION INFORMATION

Bulletin of Chemical Reaction Engineering and Catalysis (ISSN 1978-2993)

Short journal title: **Bull. Chem. React. Eng. Catal.**

For year 2009, Volume 4, Number 1 — 2 are scheduled for publication.

Bulletin of Chemical Reaction Engineering and Catalysis is **electronically published via journal website (<http://bcrec.undip.ac.id>)**. The journal contents are open access system and free of charge.

The BCREC journal is published by:

- Department of Chemical Engineering, Diponegoro University, and
- Masyarakat Katalis Indonesia—Indonesian Catalyst Society (MKICS)

Commencement of publication: January 2006



EDITORIAL BOARD

Editor in Chief:

Dr. Istadi

Department of Chemical Engineering, Diponegoro University, Jln. Prof. Sudharto, Kampus UNDIP Tembalang, Semarang, Central Java, INDONESIA 50239; E-mail: bcrec@undip.ac.id

Editorial Member:

Prof. Dr. Purwanto, Department of Chemical Engineering, Diponegoro University, Jln. Prof. Sudharto, Kampus UNDIP Tembalang, Semarang, INDONESIA 50239, E-mail: purwa61@yahoo.fr

Dr. Didi Dwi Anggoro, Department of Chemical Engineering, Diponegoro University, Jln. Prof. Sudharto, Kampus UNDIP Tembalang, Semarang, INDONESIA 50239, E-mail: anggoro@alumni.undip.ac.id

Dr. Mohammad Djaeni, Department of Chemical Engineering, Diponegoro University, Jln. Prof. Sudharto, Kampus UNDIP Tembalang, Semarang, Central Java, INDONESIA 50239, E-mail: [mzaini98\[at\]yahoo.com](mailto:mzaini98[at]yahoo.com)

ADVISORY INTERNATIONAL EDITORIAL BOARDS

Prof. Mostafa Barigou

School of Chemical Engineering, University of Birmingham, Edgbaston, Birmingham B15 2TT, United Kingdom, Tel: +44 (0) 121 414 5277, Fax: +44 (0) 121 414 5324, Email: m.barigou@bham.ac.uk

Prof. Dr. Raghunath V. Chaudhari

Center for Environmental Beneficial Catalysis, Department of Chemical and Petroleum Engineering, The University of Kansas, 1501 Wakarusa Dr., Building B-Room 112B, Lawrence, KS 66047-1803, USA, Phone: 785 864 1634; Fax: 785 864 6051, Email: [rvc1948\[at\]ku.edu](mailto:rvc1948[at]ku.edu)

Prof. Dr. Dmitry Yu. Murzin

Laboratory of Industrial Chemistry and Reaction Engineering, Abo Akademi University, Biskopsgatan 8, 20500, Turku/Åbo, Finland, ph: + 358 2 215 4985 fax:+ 358 2 215 4479, e-mail: [dmurzin\[at\]abo.fi](mailto:dmurzin[at]abo.fi)

Dr. Yibo Zhou

2351 Gilman Hall, Department of Chemistry, Iowa State University, USA, Phone: 1-515-294-6986, Email: [yibozhou\[at\]iastate.edu](mailto:yibozhou[at]iastate.edu)

Prof. Dr. Ram Prasad

Department of Chemical Engineering and Technology, Institute of Technology, Banaras Hindu University, India, E-mail: [rprasad.che\[at\]itbhu.ac.in](mailto:rprasad.che[at]itbhu.ac.in)

Assoc. Prof. Dr. Subagjo

Department of Chemical Engineering, Institut Teknologi Bandung, Jl. Ganesha 10, Bandung, Indonesia, E-mail: subagjo@che.itb.ac.id

Assoc. Prof. Dr. Abdullah

Department of Chemical Engineering, Diponegoro University, Semarang, Indonesia, E-mail: abd_busairi@yahoo.com

Prof. Dr. Nor Aishah Saidina Amin

Chemical Reaction Engineering Group (CREG), Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia, E-mail: noraishah@fkkksa.utm.my

Assoc. Prof. Dr. Y. H. Taufiq-Yap

Putra Centre for Catalysis Science and Technology, Department of Chemistry, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia, E-mail: yap@fsas.upm.edu.my

Assoc. Prof. Dr. Hadi Nur

Ibnu Sina Institute for Fundamental Science Studies, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia, E-mail: hadi@kimia.fs.utm.my

Prof. Dr. Abdul Rahman Mohamed

School of Chemical Engineering, Universiti Sains, Malaysia, 14300 Nibong Tebal, Pulau Penang, Malaysia, E-mail: chrahman@eng.usm.my

Dr. Hery Haerudin

Research Center for Chemistry, Indonesian Institute Of Sciences (PP Kimia – LIPI), Kawasan PUSPIPTEK, Tangerang, Banten, Indonesia

Assoc. Prof. Dr. Sibudjing Kawi

Department of Chemical and Biochemical Engineering, National University of Singapore, Singapore, E-mail: chekawis@nus.edu.sg

Dr. Yang Hong

Dalian Institute of Chemical Physics, Chinese Academy of Sciences, 457 Zhongshan Road, Dalian 116023, China E-mail: yanghong@dicp.ac.cn



PREFACE

BULLETIN OF CHEMICAL REACTION ENGINEERING & CATALYSIS (BCREC), Volume 4, Number 1, Year 2009 is an electronic journal as a media for communicating all research activities in Chemical Reaction Engineering and Catalysis fields, and disseminating the novel technology and news related to chemical reaction engineering, catalyst engineering and science, and catalytic reactor engineering.

In this issue, articles related to Design of a Compact and Versatile Bench Scale Tubular Reactor, Design of a Simple and Cheap Water Electrolyser for the Production of Solar Hydrogen, Catalytic Hydrolysis of Ethyl Acetate using Cation Exchange Resin, and Biodiesel Production from Vegetable Oil over Plasma are highlighted.

The BCREC journal is an online journal. Visitors can read and download any full-text article for free of charge. The research article submitted to the BCREC journal will be peer-reviewed. Accepted research articles will be available online (free download) following the journal peer-reviewing process. Language used in this bulletin is English or Indonesian, but English is preferable.

Website address of BCREC is : <http://bcrec.undip.ac.id/>

Editor would like to appreciate all researchers, academicians, industrial practitioners focused on chemical reaction engineering and catalysis to contribute to this online journal. This journal is also planned to be a reputable international journal.

Dr. Istadi (Chief Editor)

Chemical Reaction Engineering & Catalysis, Department of Chemical Engineering, Diponegoro University
E-mail: bcrec@undip.ac.id



TABLE OF CONTENTS

1. Aims and Scope	(1)
2. Indexing and Abstracting	(1)
3. Editorial Board	(2)
4. Preface	(3)
5. Table of Content	(4)
6. Design of a Compact and Versatile Bench Scale Tubular Reactor (<i>R. Prasad, Gaurav Rattan</i>).....	(5 - 9)
7. Design of a Simple and Cheap Water Electrolyser for the Production of Solar Hydrogen (<i>R. Prasad</i>)	10 - 15)
8. Catalytic Hydrolysis of Ethyl Acetate using Cation Exchange Resin (Amberlyst - 15): A Kinetic Study (<i>K.R. Ayyappan, Amrit Pal Toor, Ritu Gupta, Ajay Bansal, and R.K. Wanchoo</i>)	(16 - 22)
9. Biodiesel Production from Vegetable Oil over Plasma Reactor: Optimization of Biodiesel Yield using Response Surface Methodology (<i>Istadi, Didi Dwi Anggoro, Putut Marwoto, Suherman, Bambang Tri Nugroho</i>)	(23 - 31)
10. Author Guidelines	(32 - 34)
11. Copyright Transfer Agreement	(35 - 36)
12. Submission Information	