Padjadjaran International Physics Symposium 2013

Book of Abstract

Contribution of Physics on Environmental and Energy Conservations

Department of Physics
Faculty of Mathematics and Natural Sciences
Universitas Padjadjaran
2013

Editors:
Camellia Panatarani, I Made Joni, Dini Fitriani,
Fitrilawati, Imran Hilman, Darmawan Hidayat

Symposium Information:
http://portal.phys.unpad.ac.id/PIPS2013/index.htm

Preface

It is great pleasure for us to deliver our welcome to Padjadjaran International Physics Symposium 2013 and to Universitas Padjadjaran in Jatinangor, West Java, Indonesia. This symposium is organized by Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran. It is also supported by Indonesian Physical Society (HFI), Indonesian Optical Society (InOS), and Materials Research Society Indonesia (MRS-id).

This symposium is aimed at enhancing communications among the researchers in physics and its related fields to their contribution on environmental and energy conservations. About 100 papers are presented in a wide range of physics and its applications for environmental and energy conservations, including Material Sciences, Instrumentations, Geophysics, and Theoretical Physics. We expect that this symposium will become a forum where the researchers in the world can meet to discuss the results of their research and to promote some research collaborations between some researchers in Indonesia and other countries.

The world especially Indonesia is waiting the real contribution of physics on environmental and energy conservations. We hope it will appear very soon in the near future.

All members of the commitees would like to thank the Rector of Universitas Padjadjaran, the Dean of Faculty Mathematics and Natural Sciences, Universitas Padjadjaran, the Head of Department of Physics, Universitas Padjadjaran, advisory commitee, participants and to all who have contributed to organize this Padjadjaran International Physics Symposium 2013.

Risdiana
Chairperson

Content

Symposium Program

1st Day: May 7, 2013

Time	Agenda
08.00 – 08.25	Registration
08.25 – 08.30	Welcoming address **Dr. Risdiana** (Chairman of PIPS2013)
08.30 – 09.15	Keynote Speaker "Vibrational of organic thin films used for electronic devices" **Prof. Yukio FURUKAWA** Dept. of Chemistry and Biochemistry, School of Advanced Science and Engineering, Waseda University, JAPAN
09.15 – 09.45	Invited Speaker *"High Energy Optical Conductivity and Anomalous Spectral Weight Transfer in Correlated Electron Systems"* **Dr. Andrivo RUSYDI** Singapore Synchrotron Light Source (SSLS), Department of Physics, National University of Singapore, SINGAPORE
09.45 – 10.15	Coffee Break
10.15 – 10.45	Invited Speaker *"Micro Combined Heat and Power Sytems : State of the Art and Recent R&D Activities"* **Prof. Monica SIROUX** INSA Strasbourg, FRANCE
10.45 – 11.15	Invited Speaker *"Recent Status and Challenges of the DC House for Rural Electrification"* **Prof. TAUFIK** Electrical Engineering Department, California Polytechnics State University, USA
11.15 – 12.00	Opening Ceremony of PIPS 2013
12.00 – 13.00	Lunch Break
13.00 – 14.30	Poster Session
14.30 – 15.00	Coffee Break / Poster Session
15.00 – 17.00	Parallel Session
18.00 – 20.00	Conference Dinner

2nd Day: May 8, 2013

Time	Agenda
08.00 – 08.45	Keynote Speaker *"Hybrid Solar Cells of Conjugated Polymers Metal-Oxide Nanocrystals Blends; State of the Art and Future Research Challenges in Indonesia"* **Dr. Ayi BAHTIAR** Department of Physics, Universitas Padjadjaran, INDONESIA
08.45 – 09.15	Invited Speaker *"Revised View on Superconductivity inT-214 Cuprates without Excess Oxygen"* **Prof. Yoji KOIKE** Department of Applied Physics, Tohoku University, JAPAN
09.15 – 09.45	Coffee Break
09.45 – 10.15	Invited Speaker *"MO Cluster Approach to Study Muonium in Solid System"* **Prof. Shukri SULAIMAN** Physical Sciences Programme, School of Distance Education, University Sains Malaysia, MALAYSIA
10.15 – 10.45	Invited Speaker *"The Frontier of High Energy Physics and the Large Hadron Collider"* **Dr. Kalanand MISHRA** CMS Center, Fermi National Accelerator Laboratory, USA
10.45 – 11.15	Invited Speaker *"Whiter Oxide Interface?"* **Dr. ARIANDO** Department of Physics, National University of Singapore, SINGAPORE
11.15 – 11.45	Invited Speaker *"Synthesis and Dispersion of Nanoparticles for Nanostructured Materials"* **Dr. I Made JONI** Department of Physics, Universitas Padjadjaran, INDONESIA
11.45 – 12.45	Lunch Break
12.45 – 14.05	Parallel Session
14.10 – 14.45	Invited Speaker *"Investigation on Mott transition and superconducting fluctuation of layered organic conductors by magnetic susceptibility measurement"* **Prof. Hiromi TANIGUCHI** Department of Physics, Graduate School of Science and Engineering, Saitama University, JAPAN

Time	Agenda
14.45 – 15.15	Invited Speaker *"Deep Structure of Eastern of Bandung Basin Based on 2D Resistivity Structure"* **Dr. Asep HARJA** Department of Physics, Universitas Padjadjaran, INDONESIA
15.15 – 16.15	Tribute to Prof. Rustam E. SIREGAR
16.15 – 16.35	Closing Ceremony
16.35 – 17.00	Coffee Break

3rd Day: May 9, 2013

Time	Agenda
07.00 – 09.00	Journey to Gunung Tangkuban Perahu (volcano)
09.00 – 13.00	Sight Seeing in Gunung Tangkuban Perahu (volcano)
13.00 – 14.00	Lunch Break in Sindang Reret Restaurant
14.00 – 15.00	Journey to Bandung
15.00 – 17.00	Sight Seeing in Bandung
17.00 – 18.30	Back to Hotel

Advisory Board

Prof. Dr. Bernard Tumbelaka (Universitas Padjadjaran, Indonesia)

Prof. Dr. Rustam Siregar (Universitas Padjadjaran, Indonesia)

Tjia May On, Ph.D (Indonesian Optical Society - InOS)

Dr. Bambang Widyatmoko (Indonesian Physical Society - IPS)

Dr. rer. nat. Ayi Bahtiar (Universitas Padjadjaran, Indonesia)

Prof. Yoji Koike, Ph.D (Tohoku University-Japan)

Prof. Dr. Yukio Furukawa (Waseda University-Japan)

Dr. Isao Watanabe (RIKEN-Japan)

Dr. Kalanand Misra (Fermi Lab Cincinnati Univ-USA)

Dr. Diparkar Das (IIT Bangalore-India)

Prof. Dr. Joel Fontaine (INSA-France)

Prof. Dr. Shukri Sulaiman (University Sains Malaysia-Malaysia)

Dr. Ariando (National University of Singapore-Singapore)

Prof. Taufik, Ph.D (California Polytechnic State University-USA)

Organizing Committee

Chairperson:
Risdiana
I Made Joni

Secretary:
Camellia Panatarani
Lusi Safriani

Program:
Irwan Ary Dharmawan
Yudi Rosandi, Annisa Fitriana, Ayu Oktama

Publication and Documentation:
Sahrul Hidayat
Imran Hilman, Fadhli Hadi Surya, Sena Harimurty, Irsan Julfikar Rahman, Rijal Ziya, Yangqi Wardhono, Ridwan Lamuda

Transportation and Accommodation:
Asep Harja
Chairul Huda, Enang Saepulloh, Riza Iskandar

Logistics:
Togar Saragi
Norman Syakir, Mentari Halimun, Sandi Sapulloh, Luthfi Dwicahya, Ary Wahyudi, Zendy Aprio

Sponsorship:
Muhammad Taufik
Didi Sapdiana, Bobby Siswanto, Kevin Yudistira, Ricca Novia

Consumption:
Tuti Aryati Demen
Fitrah Bahari, Fitri Yudiasiswi

Proceeding:
Fitrilawati, Darmawan Hidayat, Dini Fitriani

Secretariat:
Kartika Hajar Kirana, Riesma Tasomara, Nia R. Juliantie, Shadrina Zulkarnaen, Rima Tisnandya, Fenfen, Syahrul, Febry Sitompul, Dwika Andjani

Keynote Speakers

[KS-1] Prof. Yukio FURUKAWA
Department of Chemistry and Biochemistry, School of Advanced Science and Engineering, Waseda University, Japan
Title: Vibrational spectroscopy of organic thin films used for electronic devices

[KS-2] Dr. Ayi BAHTIAR
Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, Indonesia
Title: Hybrid Solar Cells of Conjugated Polymers Metal-Oxide Nanocrystals Blends;
State of the Art and Future Research Challenges in Indonesia

Invited Speakers

[INV-1] Dr. Andrivo RUSYDI
Department of Physics, National University of Singapore
Title: High Energy Optical Conductivity and Anomalous Spectral Weight Transfer in Correlated Electron Systems

[INV-2] Prof. Monica SIROUX
National Institute of Applied Sciences of Strasbourg (INSA), France
Title: Micro Combined Heat and Power Systems: State of The Art and Recent R&D Activities

[INV-3] Dr. I Made JONI
Department of Physics, Faculty of Mathematics and Natural Sciences Universitas Padjadjaran
Title: Synthesis and Dispersion of Nanoparticles for Nanostructured Materials

[INV-4] Prof. Taufik
Electrical Engineering Department, California Polytechnic State University San Luis Obispo, USA
Title: Recent Status and Challenges of the DC House Project for Rural Electrification

[INV-5] Prof. Yoji KOIKE
Department of Applied Physics, Tohoku University, Japan
Title: Revised View on Superconductivity in T'-214 Cuprates without Excess Oxygen

[INV-6] Prof. Shukri SULAIMAN
Physical Sciences Programme, School of Distance Education, Universiti Sains Malaysia, 11800 Penang, Malaysia
Title: MO Cluster Approach to Study Muonium in Solid Systems.

[INV-7] Dr. Kalanand MISHRA
Fermi National Accelerator Laboratory, MS 205, Wilson & Kirk Roads, Batavia, IL 60510, USA
Title: The Frontier of High Energy Physics and the Large Hadron Collider CMS Center

[INV-8] Dr. ARIANDO
S13-04-10 & T-Lab, Department of Physics, National University of Singapore
Title: Whither Oxide Interfaces?

[INV-9] Dr. Dipankar DAS
i2n Technologies Pvt. Ltd., 2nd Floor Entrepreneurship Center, Indian Institute of Science Campus Bangalore India 560 012
Title: Preparation of an isolated atom in optical trap for probing the quantum universe

[INV-10] Prof. Hiromi TANIGUCHI
Department of Physics, Graduate School of Science and Engineering Saitama University, Japan
Title: Investigation on Mott transition and supercondcuting fluctuation of layered organic conductors by magnetic susceptibility measurement

[INV-11] Dr. Asep HARJA
Department of Physics, Faculty of Mathematics and Natural Sciences Universitas Padjadjaran, Jl. Raya Bandung-Sumedang km. 21 Jatinangor Indonesia
Title: Deep Structure of Basin Based on 2D Resistivity Structure

Contributed Speakers

Material Science

Instrumentation and Theory

Geophysics

Ref. No : 054/PIPS/I/2013
Subject : Invitation Letter

Jatinangor, January 28, 2013

To : **Dr. Togar Saragi**
Department of Physics,
Universitas Padjadjaran (UNPAD)
Jl. Raya Bandung - Sumedang km.21 Sumedang 45363

Dear Dr. Togar Saragi,

Department of Physics, Universitas Padjadjaran is organizing Padjadjaran International Physics Symposium 2013 (PIPS 2013) http://portal.phys.unpad.ac.id/PIPS2013/index.htm.

The PIPS 2013 will be held on **May 7-9, 2013** in Universitas Padjadjaran, Jatinangor, West Java Indonesia is aimed at enhancing communications among the researchers in physics and related fields to their contribution on environmental and energy conservations.

The symposium covers a wide range of physics and its application for environmental and energy conservations, including material sciences, instrumentations, geophysics and theoretical physics.

We would like to invite you to attend PIPS 2013 as **contributed speaker** since you are an active member of the international community in the physics and related fields.

Please note that this letter of invitation does not imply neither an invited talk nor waiving of registration fee.

The selected papers from accepted Abstracts plan to be published in the American Institute of Physics Conference Proceeding (indexed Scopus).

We look forward to seeing you in Universitas Padjadjaran and to your active participation in PIPS 2013.

Thank you.

Sincerely yours,

Risdiana, Ph.D
Chairman of Organizing Committe

The Effect of pH of Methaoxyethanol Solution to Structure and Magnetic Properties of $CoFe_2O_4$

Togar Saragi, N. Syakir, T. H. Nainggolan, C. Alboin, Risdiana
Jurusan Fisika Universitas Padjadjaran
Jl. Raya Bandung-Sumedang, Km 21 Jatinangor, Sumedang
email: t.saragi@phys.unpad.ac.id

MS-34

Abstract

Cobalt ferrite oxide ($CoFe_2O_4$) have been successfully prepared by a sol gel method, using methaoxyethanol as a solution, diethanolamine as a catalis and $Co(CH_3COO_2)_2.4H_2O$, $Fe(CH_3COO_2)_2.9H_2O$ as a precursor for Co^{2+} and Fe^{3+}, respectively. The structure and morfology of crystal were measured by XRD and SEM/EDX. Magnetization and their hysteresis properties were measured by vibrating sample magnetometre to investigate remnant magnetization, coercive field and uniaxial anisotropy field. The quality of $CoFe_2O_4$ crystal increases by increasing the pH of methaoxyethanol solution. The magnetic properties also significantly depend on the values of pH of methaoxyethanol solution. Detail descriptions of effect of pH of methaoxyethanol solution to their structure and magnetic properties of $CoFe_2O_4$ will be discussed.

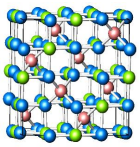
Keywords: sol gel, $CoFe_2O_4$, magnetic remnant, coercive field, uniaxial anisotropy field.

PACS: 82.33.Ln, 75.47.Lx, 75.30.Cr, 75.60.-d, 75.60.Ch, 75.60.Nt

Introduction

1. Preparation of ferrite materials has receive much attention due to their considerable importance to the elctronic materials industries, Magnetic rubber dan plastic bonded magnet, Disk magneto-optical (MO)/magnetic recording, Millimetre-wave filters, Devices with frequency tuning provided by an external magnetic field, Coplanar Waveguides (CPWs) dalam microwave integrated circuits (MICs) dan monolithic microwave integrated circuits (MMICs) [1-5],
2. Furthermore, it has high chemical stability and mechanical hardness, and thus is a good candidate for high-density recording media [6-8],
3. Cobalt ferrite ($CoFe_2O_4$) is a cubic oxide which has large magneto-crystalline anisotropy (K_1 = +2 × 10^6 erg/cm3) and also high saturation of magnetization (33.44 kWb/m^2) [7-9],
4. The optimal structure for the enhanced magnetic properties of Co ferrite is the perfect inverse spinel (oxygen layers and six Fe^{3+} ions) [8], in which the octahedral B sites are occupied by 8 Co^{2+} and 8 Fe^{3+} cations, while the tetrahedral A sites are occupied by the remaining 8 Fe^{3+} cations.

Co atom (green) Co, Fe atom (pink), O atom (blue).



In this this study, we prepare $CoFe_2O_4$ by sol-gel method. The main advantage: good control of the formation of ferrite particle, reduction of annealing temperature, and good homogeneity.

Methode

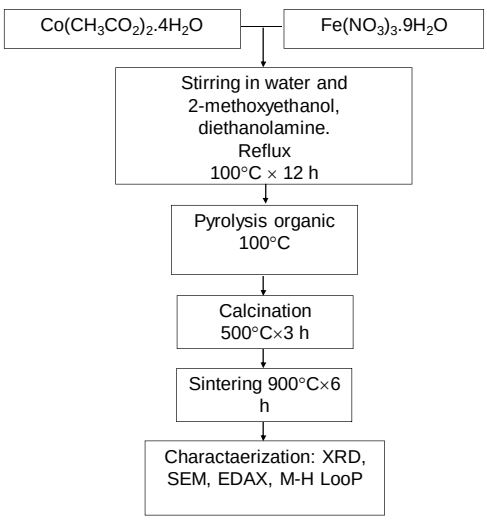


Fig 1. Preparation process for cobalt ferrite powders by sol gel method.

FTIR Measurement

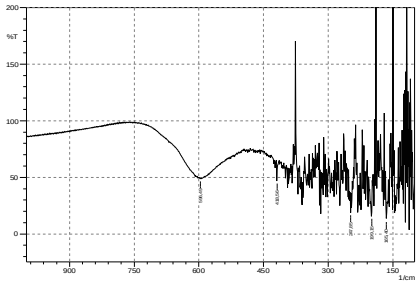


Fig. 1 FTIR measurement of sample CFO5, the wavelength of 596 cm^{-1} indicates the formation of ferrite nanoparticle (CFO5). This result is similar with Xing-Hua Li, *at.al.* [10]

XRD Measurement

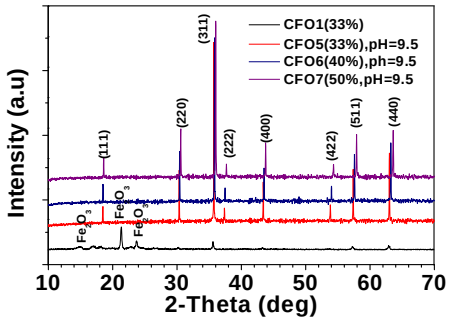


Fig. 2 XRD measurement of sample CFO1, CFO5, CFO6 and CFO7

SEM Measurement

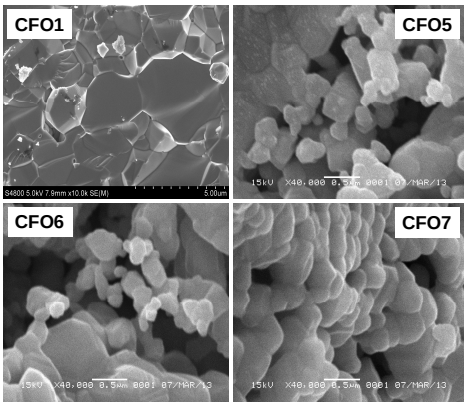


Fig. 3 SEM measurement of sample CFO1, CFO5, CFO6 and CFO7

Magnetic Characterization

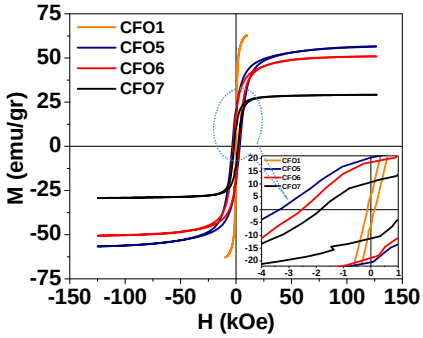


Fig. 2 MH-Loop of sample: CFO1, CFO5, CFO6 and CFO7.

Table 1. Remnant magnetization, Mr and Coerccive Field (Hc) of sample: CFO1, CFO5, CFO6 and CFO7.

Sample	m_r (emu/gr)	H_c (kOe)	Description
CFO1	5.3277	0.1388	Co2+ = 33%, Fe3+ = 67%, pH = -
CFO5	20.3173	3.3637	Co2+ = 33%, Fe3+ = 67%, pH = 9.5
CFO6	18.6634	2.5160	Co2+ = 40%, Fe3+ = 60%, pH = 9.5
CFO7	11.5045	1.8577	Co2+ = 50%, Fe3+ = 50%, pH = 9.5

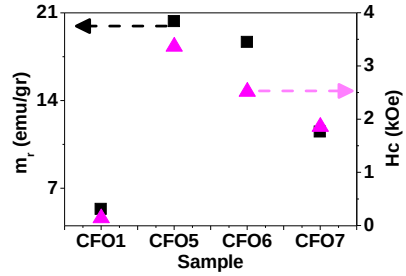


Fig. 3 M_r and H_c curve of sample: CFO1, CFO5, CFO6 and CFO7.

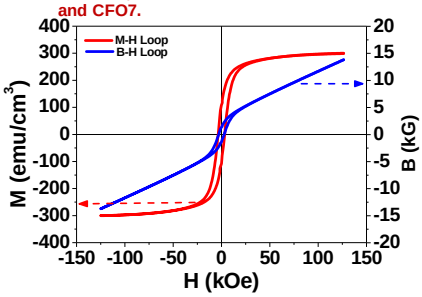


Fig. 4 Polarization, J curve (M-H loop) and Induction, B curve (B-H) loop of sample: CFO5. H_{cB}= 2.9603 kOe, B_r = 1.3619 kG, $(BH)_{max}$ = 1.2809 MGOe (Uniaxial Anisotrophy Field).

Conclusion:

1. **Cobalt ferrite oxide ($CoFe_2O_4$) have been successfully prepared by a sol gel method.**
2. **The quality of $CoFe_2O_4$ crystal increases by adding pH of methaoxyethanol solution.**
3. **The minimum grain size of particle are about of ≥ 150 nm.**
4. **The magnetic characterization are also increasing by adding of pH of methaoxyethanol solution for sample Co^{2+} : Fe^{3+} = 33;67 (CFO1 and CFO5)**
5. **However this characterization decrease by increaseing of the cation composition Co^{2+} and Fe^{3+} (at pH = 9.5)**
6. **From the induction curve, it shows that the uniaxial charactrizations are: H_{cB}= 2.9603 kOe, B_r = 1.3619 kG, and $(BH)_{max}$ = 1.2809 MGOe**

Acknowlegment

This work was supported by Program Desentralisasi Penelitian Unggulan Perguruan Tinggi No. 428/UN6.R/PL/2012, February 6, 2012. DIPA BLU No. 0578/023-04.2.16/12/2012, December 09, 2011. Thanks to Prof. Y. Koike, Prof. T. Adachi, Dr. T. Kawamata, and H. Sato for supporting our XRD measurement at Tohoku University, Japan.

Referensi:

1. E. C. Snelling, "Soft Ferrites/Properties And Application" 2nd Ed, Butterworths, London, 1988.
2. J . Petzold, *Scripta Materilia. 48 (2003) 895.*
3. T. P. Niesen, and M. R. De Guire, *J. Electroceram.* **6,** (2001) 169.
4. M. Yoshimura, W. L. Suchanek and K. Byrappa. *Mater. Res. Soc. Bull.* ***25 (2000) 17.***
5. W. H. Von Aulock And C. E. FAY, In "Linear Ferrite Devices For Microwave Applications" Edited By L. Marton (Academic Press, New York, 1968) P. 14.Gignoux D., Schlenker M. "Magnetism," Vol. 2, Materials And Applications, Springer, 2005.
6. T. Kodama, Y. Kitayama, M. TSUJI And Y. Tamaura, *J. Appl. Phys.* ***71 (1992) 5926.***
7. E. S . Murdock, *Ieee Trans. Magn.* ***28 (1992) 3078.***
8. S . A. Chambers, R. F. C. Farrow, S . Maat, M. F. Toney, L. Folks, J . G. Catalano, T. P. TRAINOR And G. E. Brown, Jr. , *J. Magn. Magn. Mater.* ***246 (2002)*** 124
9. D. Bonnenberg, E. L. Boyd, B. A. Calhoun, V. J . Folen, W. Graper, A. P. Greifer, C. J .Kriessman, R. A. Lefever, T. R. Mc Guire, M. Aulus, G. H. Stauss, R. VAUT I ER And H. P. J . Wijn, In "Landolt-bornstein" Vol. 4, Edited By K. H. Hellwege And A. M. Hellwege (Springer-verlag Berlin, New York, 1970).
10. Xing-Hua Li , Cai-Ling Xu, Xiang-Hua Han, Liang Qiao, Tao Wang , Fa-Shen Li. Nanoscale Res Lett (2010) 5:1039–1044.

CERTIFICATE

This is to certify that

Togar Saragi

has participated as

Contributed Speaker

in Padjadjaran International Physics Symposium 2013
May 7 - 9 2013, Jatinangor Indonesia

Organized by:

Department of Physics
Faculty of Mathematics and Natural Sciences
Universitas Padjadjaran

PIPS 2013

Prof.Dr. Budi Nurani R, M.S.
Dean of Faculty of Mathematics and Natural Sciences

Dr. Risdiana, M.Eng.Sc.
Chairman of PIPS 2013