

**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 committees 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 committee, participants and to all who have contributed to organize this Padjadjaran International Physics Symposium 2013.

Risdiana
Chairperson

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

Time	Agenda
14.45 – 15.15	Invited Speaker <i>“Deep Structure of Eastern of Bandung Basin Based on 2D Resistivity Structure”</i> 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)

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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 superconducting 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

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Padjadjaran International Physics Symposium 2013

*Contribution of Physics on Environmental and
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<http://portal.phys.unpad.ac.id/PIPS2013/>

May 7-9, 2013
Jatinangor, Jawa Barat
Indonesia

Ref. No : 054/PIPS/I/2013

Jatinangor, January 28, 2013

Subject : Invitation Letter

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.

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The Effect of pH of Methoxyethanol Solution to Structure and Magnetic Properties of CoFe_2O_4

Togar Saragi, N. Syakir, T. H. Nainggolan, C. Albain, Risdiana
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MS-34

Abstract

Cobalt ferrite oxide (CoFe_2O_4) have been successfully prepared by a sol gel method, using methoxyethanol as a solution, diethanolamine as a catalis and $\text{Co}(\text{CH}_3\text{COO})_2 \cdot 4\text{H}_2\text{O}$, $\text{Fe}(\text{CH}_3\text{COO})_3 \cdot 9\text{H}_2\text{O}$ 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 methoxyethanol solution. The magnetic properties also significantly depend on the values of pH of methoxyethanol solution. Detail descriptions of effect of pH of methoxyethanol solution to their structure and magnetic properties of CoFe_2O_4 will be discussed.

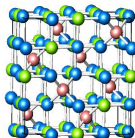
Keywords: sol gel, CoFe_2O_4 , magnetic remnant, coercive field, uniaxial anisotropy field.

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 electronic 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 ($K_1 = +2 \times 10^6$ erg/cm³) and also high saturation of magnetization (33.44 kWb/m²) [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 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.

Metode

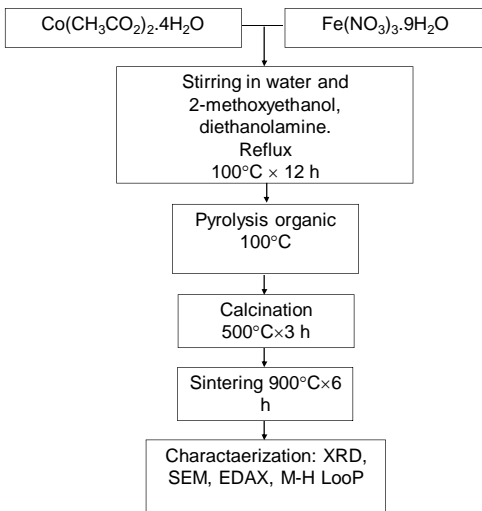


Fig 1. Preparation process for cobalt ferrite powders by sol gel method.

FTIR Measurement

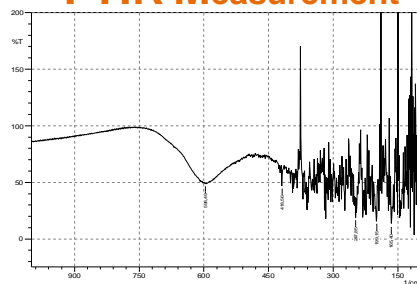


Fig. 1 FTIR measurement of sample CFO5, the wavelength of 596 cm^{-1} indicates the formation of ferrite nanoparticle (CFO5). This result is similar with Xing-Hua Li, *et al.* [10]

XRD Measurement

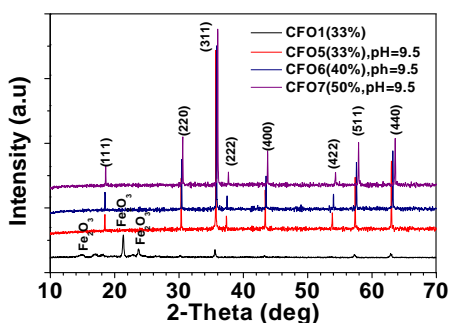


Fig. 2 XRD measurement of sample CFO1, CFO5, CFO6 and CFO7

SEM Measurement

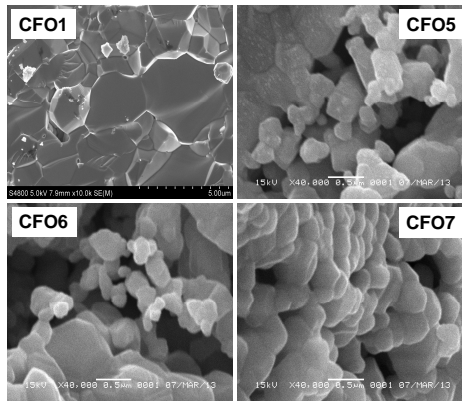


Fig. 3 SEM measurement of sample CFO1, CFO5, CFO6 and CFO7

Magnetic Characterization

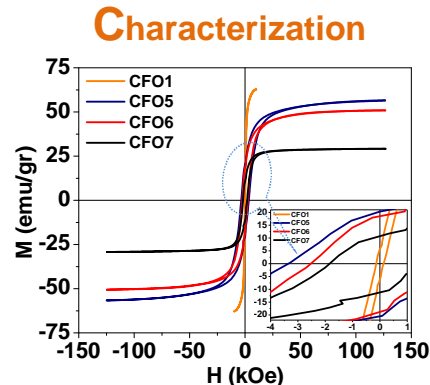


Fig. 2 M-H-Loop of sample: CFO1, CFO5, CFO6 and CFO7.

Table 1. Remnant magnetization, M_r and Coercive Field (H_c) of sample: CFO1, CFO5, CFO6 and CFO7.

Sample	m_r (emu/gr)	H_c (kOe)	Description
CFO1	5.3277	0.1388	$\text{Co}^{2+} = 33\%$, $\text{Fe}^{3+} = 67\%$, pH = -
CFO5	20.3173	3.3637	$\text{Co}^{2+} = 33\%$, $\text{Fe}^{3+} = 67\%$, pH = 9.5
CFO6	18.6634	2.5160	$\text{Co}^{2+} = 40\%$, $\text{Fe}^{3+} = 60\%$, pH = 9.5
CFO7	11.5045	1.8577	$\text{Co}^{2+} = 50\%$, $\text{Fe}^{3+} = 50\%$, pH = 9.5

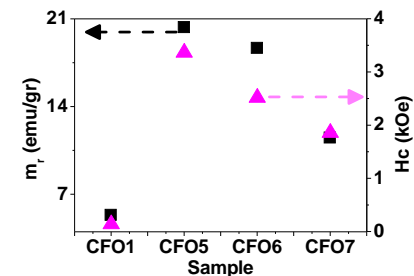


Fig. 3 M_r and H_c curve of sample: CFO1, CFO5, CFO6 and CFO7.

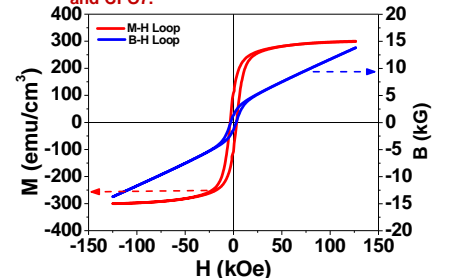


Fig. 4 Polarization, J curve (M-H loop) and Induction, B curve (B-H) loop of sample: CFO5. $H_{CB} = 2.9603$ kOe, $B_s = 1.3619$ kG, $(BH)_{max} = 1.2809$ MGOe (Uniaxial Anisotropy Field).

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 methoxyethanol 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 methoxyethanol solution for sample $\text{Co}^{2+} : \text{Fe}^{3+} = 33:67$ (CFO1 and CFO5)
5. However this characterization decrease by increasing of the cation composition Co^{2+} and Fe^{3+} (at pH = 9.5)
6. From the induction curve, it shows that the uniaxial characterizations are: $H_{CB} = 2.9603$ kOe, $B_s = 1.3619$ kG, and $(BH)_{max} = 1.2809$ MGOe

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CERTIFICATE

This is to certify that

Togar Saragi

has participated as

Contributed Speaker

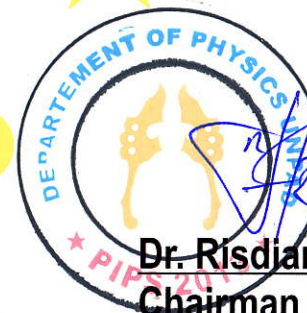
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