

6th International Conference on Functional Materials Science

Selected peer-reviewed extended
articles based on abstracts presented at the
6th International Conference on
Functional Materials Science (ICFMS-2022)

Aggregated Book

Edited by

**Prof. Agustinus Agung Nugroho,
Prof. Darminto Darminto and Prof. Risdiana Risdiana**

■ *Scientific.Net* ■

Copyright © 2023 Trans Tech Publications Ltd, Switzerland

All rights reserved. No part of the contents of this publication may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

Trans Tech Publications Ltd
Seestrasse 24c
CH-8806 Baech
Switzerland
<https://www.scientific.net>

Volume 84 of
Scientific Books Collection
ISBN 978-3-0364-0174-4

Full text available online at <https://www.scientific.net>

Distributed worldwide by
Trans Tech Publications Ltd
Seestrasse 24c
CH-8806 Baech
Switzerland
Phone: +41 (44) 922 10 22
e-mail: sales@scientific.net

Printed with permission by
Curran Associates Inc. (2023)

CURRAN ASSOCIATES INC.
proceedings
.com

Additional copies of this
publication are available from:

Web: www.proceedings.com/71078.html

Table of Contents

Preface, Organizing Committee

v

Chapter 1: Materials for Energy Storage and Conversion Devices

Synthesis of TiO₂ Nanofiber as Photoanode of Dye Sensitized Solar Cells (DSSC)

A.R. Fajariah, E.S. Nurazizah, F. Faizal and L. Safriani 3

Biopolymer Kappa Carrageenan with Ammonium Chloride as Electrolyte for Potential Application in Organic Battery

P.S. Rudati, Y. Dzakiyyah, R. Fane, M.A.F. Turnip, M.T. Pambudi and P. Wulandari 10

NaFePO₄ Particles as a Cathode of Sodium Ion-Battery via Sol-Gel Method: A Review on Synthesis

F. Astuti, B.R. Oeza, E.S. Rahmawati and D. Darminto 16

Performance Improvement of Dye-Sensitized Solar Cells Using a Combination of TiO₂ and ZnO as Photoanodes

E.S. Nurazizah, A.R. Fajariah, A. Aprilia and L. Safriani 24

A Rapid Synthesis of Zeolitic Imidazolate Framework-14 Cobalt (ZIF-14 Co) for Surface Modification of LiFePO₄ as Lithium-Ion Battery Cathode Material

R. Edwin, D.R. Eddy and I. Rahayu 30

Ferrofluid Mn_{0.5}Zn_{0.5}Fe₂O₄ as Harvesting Energy: Preliminary Study

D. Santi, S. Zuhroh, A. Hidayat, S.T.U.I. Subadra and A. Taufiq 38

Photovoltaic Characteristics of the a-C/a-C:B Homo Junction from Palmyra Sugar with Nano-Spray Method

B. Priyanto, I. Khambali, M.H. Chasrun and Darminto 45

Characterization and Performance Evaluation of Yttria-Stabilized Zirconia (YSZ) Thickness on ZnO Nanorods-Based Photoelectrochemical Cell

N. Mufti, F. Ansar, E. Latifah, M. Dioktyanto, A.S.P. Dewi, M.T.H. Abadi, E.T. Sari, B.H. Arrosyid, A. Noviyanto and A. Arramel 52

The Effect of Ni Doping Variations on the Microstructure and Conductivity of LiNi_xFe_{1-x}PO₄/C Composite Materials

M. Zainuri, E. Novialent and T. Triwikantoro 60

Carbonization at Varying Temperatures of PVA-Derived Nanofibers Fabricated by Electrospinning

D. Anggoro, N. Mukarromah, S. Sudarsono, E. Purwandari, M.A. Baqiya, G. Yudoyono and D. Darminto 68

Chapter 2: Materials with Magnetic and Superconducting Properties

Magnetic Susceptibility Study of Hole-Doped Organic Metal κ-(ET)₄Hg_{3-δ}Cl₈, δ=22% and κ-(ET)₄Hg_{3-δ}Br₈, δ=11%

D.P. Sari, U. Widyaiswari, Y. Someya, E. Yamada, H. Taniguchi, I. Watanabe and Y. Ishii 77

Magnetic and Superconducting Phase Diagram of Electron-Doped Eu_{2-x}Ce_xCuO_{4+α-δ}

Y. Maryati, M.A. Syakuur, U. Widyaiswari, D.P. Sari, T. Saragi and R. Risdiana 83

The Synthesis of (1-x-y)BiFeO₃-xBaTiO₃-yKVO₃ (x=0.33, 0.38, y=0.01) Composition and its Effect on the Electrical Properties	
F. Latief, M.A. Baqiya and S. Suasmoro	90
Effect of Chromium Substitution on Microstructure and Magnetic Properties of La_{0.7}Sr_{0.2}Ba_{0.1}Mn_{1-x}Cr_xO₃ (x = 0, 0.03, 0.05, 0.07, 0.1)	
D.R. Munazat, B. Kurniawan, T. Aprilianto and M. Manawan.....	99
Characterization of Barium Hexaferrite (BaFe₁₂O₁₉) from Nitrate Compound with Sol-Gel Method for Barium Hexaferrite Magnetic Materials	
A.D. Shieddieque, S. Virdhian and M.I.Z. Muttahar	104
Study of Crystal Structure and Magnetics Properties in the Normal State of Electron-Doped Eu_{2-x}Ce_xCu_{0.97}Zn_{0.03}O_{4+α-δ} in Overdoped Regime	
R. Pratama, M.F. Falhan, R.S. Effendi, M.A. Syakuur, U. Widyaiswari, D.P. Sari, T. Saragi and R. Risdiana.....	112
Microstructure, Magnetic and Electrical Transport Properties of Sol-Gel Synthesized La_{0.7}Sr_{0.2}Ca_{0.1}MnO₃:TiO₂ Composite	
Z. Zulkarnain, B. Kurniawan, A. Imaduddin, H. Nugraha and D.R. Munazat	119
Investigation of Dependence of Magnetic Properties on Sintering Temperature of Eu_{1.85}Ce_{0.15}CuO_{4+α-δ} Prepared by Sol-Gel Method	
M.F. Falhan, S. Winarsih, R. Pratama, M.A. Syakuur, U. Widyaiswari, A.E. Putri, T. Saragi and R. Risdiana.....	126
 Chapter 3: Carbon-Based Materials	
Interaction of Hydrogen with Reduced Graphene Oxide Probed by Muon-Spin Relaxation Technique	
R. Asih, D.P. Sari, M.A. Baqiya, I. Watanabe and D. Darminto.....	135
Disorder - Induced Characteristics Based on Optical Absorption of SiO₂/rGO-Like Carbon Films	
F. Faridawati, S. Sudarsono, A. Sholih, G. Yudoyono and D. Darminto	141
Mechanical-Thermal Stability of Micro Composite Based Porous Carbon from Coconut Shell (<i>Coccoloba nucifera</i>) Charcoal	
M.S. Sapri and Mashuri	147
Optical Absorbance of Graphenic Carbon from Coconut Shells in Different Solvents for Film Preparation	
S. Sudarsono, A. Sholih, F. Faridawati, G. Yudoyono and D. Darminto	153
N-Doped Graphenic Carbon Derived from Coconut Shell as n-Type Semiconducting Layer	
E. Purwandari, N. Nur'aini, A.A. Firdaus, A. Sholih, R. Asih, A. Subekti and D. Darminto.....	159
Study on Optical Energy Gap and the Thickness of Boron Doped Graphenic Carbon (B-GC) Film Prepared by Nanospray Method	
A.A. Firdaus, E. Purwandari, R. Asih, A. Sholih and D. Darminto	165
Probing the Magnetic Properties of Boron-Doped Graphenic-Based Carbon Materials	
D. Ristiani, P.Y.D. Maulida, A.A. Firdaus, R. Asih, F. Astuti, M.A. Baqiya, S. Tunmee, H. Nakajima and D. Darminto	171

Chapter 4: Zirconia-Based Materials**The Effect of Zirconia Content on Physical and Mechanical Properties of Al₂O₃/ZrO₂ Composites**

C.F.K. Murti, P.Z.N. Nehan, A.S. Sa'adah, A.R. Setopratama, F. Munawaroh, Munaji and T. Triwikantoro 179

Temperature and Molarity Effects on the Synthesized Zircon Crystal Cells

D.Y. Pratama, A.B.G. Valhalla, S. Ely, A.M. Hatta and P. Suminar 185

The Conductivity of PANI/Zirconia Composites: Effect of Amorphous and Crystalline Fillers

Munaji, M.A.C. Azhari, Z. Arifin, M. Zainuri and T. Triwikantoro 190

Structural and Thermal Analysis of CaCO₃/ZrO₂ Composites

F. Munawaroh, M.A. Baqiya, Z. Arifin and T. Triwikantoro 196

Chapter 5: Functional Nanomaterials**Vibrational and Structural Properties of Two-Dimensional Tin Mixed-Halide Perovskites**

S. Hartati, P.Y.D. Maulida, T. Zakly, I. Mulyani, D. Onggo, M.H. Mahyuddin, A. Noviyanto, A. Arramel and N.T. Rochman 205

Anatase/Rutile Phase Control of Titanium Oxide Nanoparticles Synthesized from Potassium Titanium Oxalate by Homogeneous Precipitation and Hydrothermal Methods

S. Kajiwara, K. Itatani, H. Kuwahara, T. Yokoi, T. Sasaki and H. Kuroe 211

Optimization of Hydrothermal Synthesis of Dysprosium Oxide Nanoparticles-Attached-Polyethyleneglycol Template Using Response Surface Methodology- Box-Behnken

S. Wyantuti, J. Iskandar, R.P. Fauzia and H.H. Bahti 217

Fabrication of Densely-Packed Janus Gold Nanoparticles Layer by Self-Assembly for a Potential Molecular Sensing Probe

M.T. Pambudi, A.A. Iskandar and P. Wulandari 223

Chapter 6: Biomaterials**Effect of Aging Time and Sonication Treatment on Hydroxyapatite Structure from Limestone**

H. Hartatiek, M.I. Wuriatika, Y. Yudyanto and A. Taufiq 231

Determination of Effective Atomic Number and Radiation Mass Attenuation Coefficient of the Bolus from Alginate Impression Material

T. Guswantoro, R. Hidayat, F. Haryanto, H. Sutanto and A. Dwi 238

Characterization of Glucomannan and Ca-Oxalate from Porang Flour (*Amorphophallus muelleri* Blume) as Candidates for Hydrogel Materials

I. Rizoputra, S. Wahyudi, N.F. Puspita, D. Darminto and R. Risdiana 244

Stability Test and Storage of PDMS as a Biomaterial for Vitreous Humour Substitution in Vitreoretinal Surgery

D.G. Auliya, N.F. Zahra, S. Setiadji, F. Fitrilawati, A.S. Kartasmita and R. Risdiana 251

The Design of a Piston Extruder for the Production of Gelatin Filaments Available for Hydroxyapatite Biocomposite 3D Printing

S. Syauqiyah, D.J.D.H. Santjojo, M. Masruroh and H.A. Dharmawan 257

Chapter 7: Computational Research of Materials

The Use of Fourier Synthesis and Maximum Entropy Method to Investigate Crystalline Defects of the T'-Pr_{2-x}Ce_xCuO₄ Nanocrystals

P.E.D. Putra, M.A. Baqiya, R. Irfanita, R. Fajarin
and D. Darminto.....269

Functional Effect in Density Functional Theory Calculation of Au₂₃(SR)₁₆ Nanocluster

S.S. Mohd-Tajudin, W.N. Zaharim, S. Shukri, S.N.A. Ahmad, D.F. Hasan-Baseri,
A.L. Sin, R. Risdiana, L. Safriani and I. Watanabe277

Chapter 8: Surface Modification Technologies

Hierarchical Structure of SiO₂ by *In Situ* Modification Combining Quartz Sand and Methyltrimethoxysilane

L. Silvia, L. Awathifi, Y. Mughayyirah, M. Zainuri and D. Darminto285

The Effect of Silica Powder Based on Methyltrimethoxysilane and Silica Sand as a Hydrophobic Material

Y. Mughayyirah, L. Silvia and M. Zainuri291

Chapter 9: Materials and Technologies for Environmental Protection

A Coin-Shaped Polypropylene Bio-Carrier Fabricated Using a Filament-Based 3D Printer for Wastewater Treatment

R. Widjaya, F. Faizal, U. Subhan, S. Hidayat, W. Hermawan, I.M. Joni
and C. Panatarani299

The Effect of Fermentation on Increasing the Physico-Chemical Quality of Fish Feed Based on Food Waste

M.D. Cahya, Y. Andriani, R. Risdiana, N. Rossiana and M.F. Wiyatna.....306

Synthesis of ZnO-Al:TiO₂ Materials and their Characterization as Photocatalyst Compounds

I. Islami, L.N. Ramadhika and A. Aprilia.....314

Chapter 10: Metallurgy and Raw Materials Processing

Effect of Wood Sawdust Addition on the Morphology, Mechanical Properties, and Thermal Properties of Mullite-Based Porous Ceramic Filter Candidates for Aluminum Casting Process

D. Dhaneswara, K. Wahyudi, M. Anis, J. Aditomo and J.F. Fatriansyah327

Effect of Starch Content on Morphology, Mechanical Properties, and Thermal Properties of Mullite-Based Porous Ceramic as a Candidate Filter in Aluminum Casting

M. Anis, K. Wahyudi, F.F. Jaka, N.M.A. Athallah, B. Suharno, A. Azhari
and D. Dhaneswara334

Thermal Decomposition Analysis of Indonesian Natural Dolomite in Air

F. Munawaroh, M.A. Baqiya, Z. Arifin and T. Triwikantoro.....342

Chapter 11: Building Materials**Effect of Fiber's Size on Acoustic Absorption of Abaca Fiber/Epoxy Resin Composites**

S. Indrawati, D.A. Abidah, L. Yuwana, G. Prajitno, S. Suyatno, M. Zainuri
and D. Darminto..... 351

Inspection of Thermo-Mechanical Behavior on Sintered Fly Ash Aggregate in Pavement Quality Concrete

P. Somani and A. Gaur..... 357

Keyword Index 363

Author Index 367