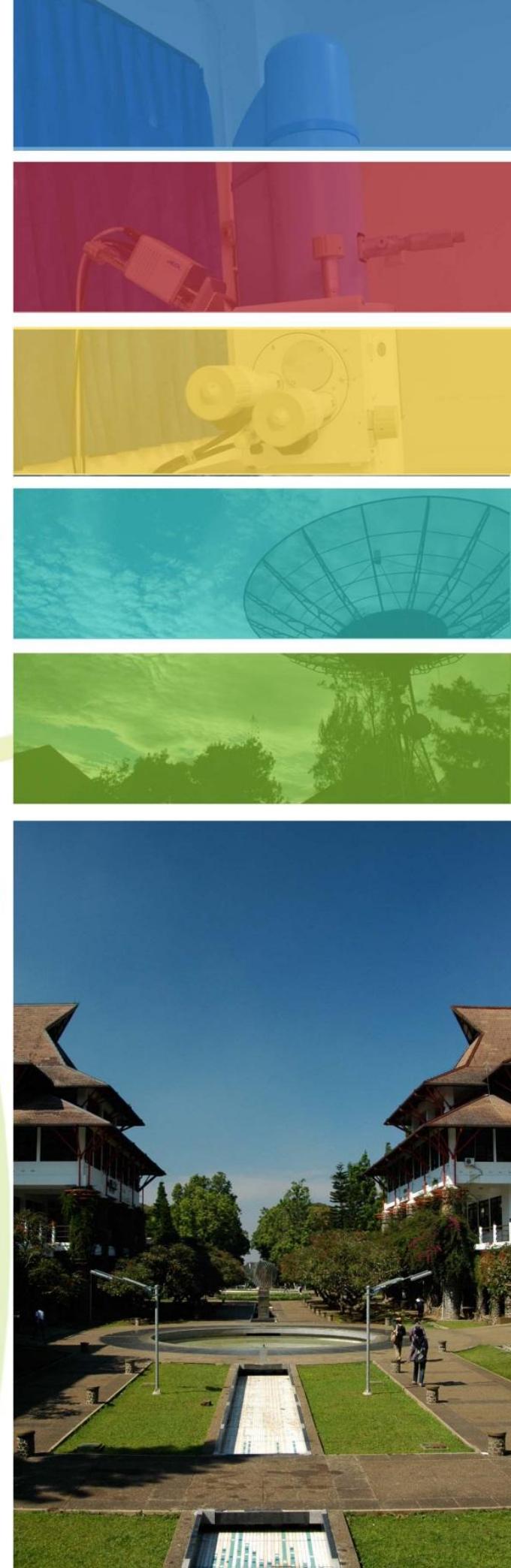




Faculty of Mathematics and Natural Sciences
Institut Teknologi Bandung

RESEARCH THEORY



FMPA 2013

RESEARCH DIRECTORY

2013

Faculty of Mathematics and Natural Sciences
Institut Teknologi Bandung

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FOREWORD

The Faculty of Mathematics and Natural Sciences was established in 1947, as a part of University Indonesia in Bandung. It finally became FMIPA (Fakultas Matematika dan Ilmu Pengetahuan Alam), as we currently know, with Institut Teknologi Bandung (ITB) charter in 1959. In its current status, FMIPA is one of the 13 faculties and schools in ITB. Its 183 permanent members are actively engaged in academic and research activities in the area of astronomy, chemistry, mathematics and physics; in basic areas of sciences, and their applications as well.

Research activities in FMIPA are carried out by its 15 research divisions, along its four traditional foundations; they are Astronomy, Chemistry cluster (Biochemistry, Analytical Chemistry, Inorganic and Physical Chemistry, and Organic Chemistry), Mathematics cluster (Algebra, Analysis and Geometry, Combinatorial Mathematics, Industrial and Financial Mathematics, and Statistics), and Physics cluster (Magnetic and Photonic Physics, Electronic Material Physics, Nuclear Physics and Biophysics, Physics of Earth and Complex Systems, and High Energy Physics and Instrumentation).

Based on the publication records of FMIPA faculty members, current trends and national priorities, in 2010, the Senate of the FMIPA declared four streams of research priorities, without leaving behind the basic research that has been the mainstay and the backbone of FMIPA all these years. The streams are

1. Renewable and innovative energy
2. Nano sciences and material
3. Instrumentation
4. Computational Sciences

A recent acquisition of new laboratory equipments arriving in the late 2010, have been in full-operation in 2011. This includes Scanning Electron Microscope, Nuclear Magnetic Resonance Spectrometer (500 MHz), ESI-MS-TOF Spectrometer (HRMS), x-ray micro CT scan, and ESI-MS-Ion Trap Spectrometer. This acquisition has put FMIPA ITB in a better position to pursue its research agenda. International collaboration on research and education, student and staff exchanges, as well as international accreditation were significantly strengthened in the year 2012 as part of internationalization programs of FMIPA.

This directory documents several aspects of research activities done by the faculty members of FMIPA ITB, and their output during the year 2012. In the coming years, FMIPA will continue to strive in pursuing its research agenda, in order to forge its reputation in national and international scenes, while making contributions to science, to humanity and to the fulfillment of Indonesia's national needs.

Umar Fauzi, Dr.rer.nat, Prof.
Dean



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ASTRONOMY RESEARCH DIVISION

ASTRONOMY RESEARCH DIVISION

The Astronomy research group is divided into 3 subgroups Galaxy and Cosmology, Stellar Physics and Solar System. Some of the research topics in the Galaxy and Cosmology subgroups are study of structure and dynamics of the Milky Way, distribution and evolution of galaxies, active galaxies (quasar), search for dark matter, and theoretical and observational cosmology. Research activities in the Stellar physics subgroup covers three main topics (a) theoretical studies and numerical modeling of stellar evolution, stellar structure and atmosphere, circum stellar envelope and matter, common and peculiar classes of variable stars (close binary, pulsating, accretion disk), light curve and spectral synthesis; (b) photometry and spectroscopy of variable stars (eclipsing binaries, Be stars, Helium stars, Am stars, cataclysmic binaries), polarimetry of Herbig Ae stars, and astrometry for orbital elements and physical parameters determination of visual double stars; (c) development of data acquisition and processing systems, i.e. CCDbased astronomical instruments, image and data processing, data archival, knowledge-based classification of digital stellar spectra. Some of research topics in the Solar System research subgroup are Solar physics (sunspot proper motion and its relation to the solar are, solar terrestrial relationships, high solar energetic particle), solar systemphysics (planetary Mars atmosphere, Titan atmosphere), near earth asteroid and dynamics and evolution of asteroids (family asteroids), orbit calculation of hazardous objects and extra solar planets.



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Grants

1. Budi Dermawan, Hesti Retno Tri Wulandari, C. S Guritno, R. W. Wibowo, Sulistyowati. Dinamika orbit asteroid dan komet pada daerah dekat bumi. *Hibah Riset dan Inovasi KK ITB 2012.*
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FMPA

1.



ANALYTICAL CHEMISTRY RESEARCH DIVISION

ANALYTICAL CHEMISTRY RESEARCH DIVISION

Analytical chemistry is a scientific discipline which develops and applies methods, instruments and strategies to obtain information on the composition and nature of matter in space and time. Our focus is on the development, validation and application of state-of-the-art, integrated and automated analytical methods and instrumentation, for trace analysis and speciation.

The mission of the research group:

Provide leadership in analytical chemistry research and education at the highest international level capable to make positive impact on the world, as well as provide supporting environment for scientific growth of each group member. The supporting environment will be created by synergy among the individual group member, supervisor, laboratory managers, senior staff and other group members.



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Grants

1. Muhammad Bachri Amran. Ion imprinted polymer (IIPs) untuk prakonsentrasi dan analisis renik ion logam berat berbasis flow injection analysis (FIA). *Hibah Riset Desentralisasi Dikti 2012*.
2. Indra Noviandri. Elektroda amalgam tembaga untuk monitoring kadar renik timbal di dalam air Sungai Cikapundung secara voltammetri. *Hibah Riset dan Inovasi KK 2012*.
3. Indra Noviandri. Pengembangan elektroda termodifikasi molecularly imprinted polymer (MIP) untuk analisis kurkumin. *Hibah Penelitian Kerjasama antar Lembaga dan PT 2012*.
4. Meyliana Wulandari, Muhammad Bachri Amran. Curcumine molecularly imprinted polymer. *Sandwich Program, Spain 2012*.
5. Handajaya Rusli, Muhammad Bachri Amran. Membrane bioreactor. *Sandwich Program, Italy 2012*.
6. Muhammad Ali Zulfikar. Peningkatan kualitas dan produksi industri garam rakyat. *Hibah Program Pengabdian Kepada Masyarakat 2013*.
7. Indra Noviandri. Kolorimeter dengan sensor light dependence resistor untuk praktikum siswa SMA. *Hibah Program Pengabdian Kepada Masyarakat 2013*.

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16. Rahayu R. S., Noviandri I., Buchari, Abdullah M., Hinoure T. The effect of laser pulse irradiation at glassy carbon electrode on the electrochemistry of dopamine an ascorbic acid. *Int. J. Electrochem. Sci.*, **7**: 8225-8265. 2012.
17. Widarti S., Amran M. B., Nurrahman Z., Buchari, Takeuchi T. Novel material; non catalytic functioning of linear polystyrene with diaminopropane- β cyclodextrin. *International Seminar on Analytical Sciences 2012*. Medan, Indonesia. 2012.
18. Koesmawati T. A., Buchari, Francesconi K. A., Ng J. C. Homogeneity and stability testing of a candidate reference material for the determination of total arsenic in tuna fish sample. *Proceeding of 4th Arsenic Congress: Arsenic in the Environment*: 370-372. Cairns-Australia. 2012.
19. Rahayu R. S. The effect of laser pulse irradiation in increasing the sensitivity of the measurement of dopamine using three types of electrodes. *A Joint Conference of 3rd Regional Electrochemistry Meeting of South-East, 27th Philippine Chemistry Congress and 2012 Asia-Pacific Conference on Analytical Science*. Metro Manila, Philippine. 2012.

20. Rusli H., Gandasasmita S., Amran M. B. Hybrid membrane for separation of starch and maltosa. *A Joint Conference of 3rd Regional Electrochemistry Meeting of South-East, 27th Philippine Chemistry Congress and 2012 Asia-Pasific Conference on Analytical Science*. Metro Manila, Philippine. 2012.
21. Murniati A., Buchari, Gandasasmita S., Nurachman Z. Preparation and characterization of polypyrrol film on glassy carbon and platinum electrodes. *A Joint Conference of 3rd Regional Electrochemistry Meeting of South-East, 27th Philippine Chemistry Congress and 2012 Asia-Pasific Conference on Analytical Science*. Metro Manila, Philippine. 2012.
22. Mulyani R., Buchari, Noviandri I., Ciptati C. Voltammetry studies for the electro-oxidation of CTAB using Pt/Co electrode in the KOH supporting electrolyte. *A Joint Conference of 3rd Regional Electrochemistry Meeting of South-East, 27th Philippine Chemistry Congress and 2012 Asia-Pasific Conference on Analytical Science*. Metro Manila, Philippine. 2012.
23. Saefurohman A., Buchari, Noviandri I. Electrode selective ion La(III) with TBP and D2EHPA as ionophore. *A Joint Conference of 3rd Regional Electrochemistry Meeting of South-East, 27th Philippine Chemistry Congress and 2012 Asia-Pasific Conference on Analytical Science*. Metro Manila, Philippine. 2012.
24. Sianipar A., Amran M. B., Buchari, Arcana I. M. Incorporation of Network in Synthesis of Zircon-Imprinted Polymer and Its Effect on Zircon Ion Extraction. *ICMNS 2012*. 2012
25. Noviandri I., Amran M. B., Dewi P. S. Poly(Eriochrome Black T) modified Carbon Paste Electrode as Amperometric Detector. *ICMNS 2012*. 2012.
26. Saefurohman A., Buchari, Noviandri I. Potentiometric selectivity of polymer-membrane electrodes based on Lanthanum. *ICMNS 2012*. 2012.
27. Ivansyah A. L., Gandasasmita S., Buchari. Synthesis of Zeolite Membranes on Stainless-Steel Grid for Salt Solution Filtration by Reverse Osmosis. *ICMNS 2012*. 2012.
28. Wulandari M., Amran M. B., Ruiz U., Bondi Mcm., Lopez D. Molecularly Imprinted Polymer as Selective Functional Material for Separation-Preconcentration and Curcumin Analysis. *ICMNS 2012*. 2012.
29. Koesmawati T. A., Buchari, Sulaeman A., Ibrahim S. Pembuatan kandidat bahan acuan (reference material) ikan tuna untuk analisis arsen total. *Seminar Nasional Kimia Analitik*. JCC-Jakarta. 2012.



FMPA



BIOCHEMISTRY RESEARCH DIVISION

BIOCHEMISTRY RESEARCH DIVISION

Biochemistry Research Group is a group of researchers and lecturers in bioscience to understand life at the molecular level, which includes the structure and interaction of atoms/molecules, the mechanism of enzyme catalyst reactions, metabolism and energetics, and genetic information.

The current research is molecular biology thermophilic microorganism and biochemistry of DNA polymerase and thermostable lipases; studies of clinical isolates of *Mycobacterium tuberculosis* resistant to anti-tuberculosis drugs; biochemical and bioprocess of enzymes acting on carbohydrates, such as family of amylase, cellulase, and chitinase; biodiesel production from micro and macro algae, as well as simulations of molecular dynamics to study protein folding and its stability.

The vision of research group is to be a leading research group in the field of biochemistry and molecular biology; The mission is to undertake education and research which contribute to the understanding of bioscience and to the improvement of human welfare, in particular Indonesian society.



Members

- | | |
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| 12. Fifi F. Masduki | M.Si. (on leave) |

Grants

1. Zeily Nurachman. Pengembangan produksi biomassa mikroalga sebagai sumber minyak nabati untuk pangan, obat-obatan dan energi. *Hibah MP3I DIKTI 2011*.
2. Akhmaloka. Analisis komunitas mikroorganisme eukayot selama proses pembuatan kompos manure sapi. *Hibah Pascasarjana DIKTI Tahun Kedua 2011*.
3. Dessy Natalia. Konsorsium Vaksin Hepatitis Nasional. *SINAS (Anggota Peneliti) 2011*.
4. Ihsanawati. Konsorsium Vaksin Tuberculosis Nasional. *SINAS (Anggota Peneliti) 2011*.

Publication

1. Viera B. V. E., Madayanti F., Aryantha I. N. P., Akhmaloka. Succession of eukaryotic communities during traditional composting of domestic waste based on PCR-DGGE analysis. *Journal of Pure and Applied Microbiology*, **6(2)**: 525-536. 2012.
2. Nurbaiti S., Martoprawiro M. A., Akhmaloka, Hertadi R. The role of electrostatic interactions on Klentaq1 insight for domain separation. *Bioinformatics and Biology Insights* 2012, **6**: 225-234. 2012.
3. Widhiastuty M. P., Wahyudi S. T., Moeis M. R., Madayanti F., Akhmaloka. Cloning and sequence analysis of lipase gene from DMS3 isolate. *Biosciences Biotechnology Research Asia* 2012, **9(1)**: 187-192. 2012.
4. Nurachman Z., Hartati, Anita S., Anward E. E., Novirani G., Mangindaan B., Gandasasmita S., Suantika G. Oil productivity of the tropical marine diatom *Thalassiosira sp.* *Bioresource Technology* 2012, **108**: 240-244. 2012.
5. Purkan, Ihsanawati, Syah Y. M., Retnoringrum D. S., Noer A. S., Shigeoka S., Natalia D. Novel mutations in katG gene of a clinical isolate of isoniazid-resistant *Mycobacterium tuberculosis*. *Biologia*, **67(1)**: 41-47. 2012.
6. Ngili Y., Noer A. S., Ahmad A. S., Syukriani Y. F., Natalia D., Syah Y. M. Variants analysis of human mitochondrial genome mutation: Study on Indonesian human tissues. *International Journal of ChemTech Research* 2012, **4(2)**: 720-728. 2012.

7. Nurachman Z., Brataningtyas D. S., Hartati, Panggabean L. M. G. Oil from the tropical marine benthic-diatom *Navicula* sp. *Applied Biochemistry and Biotechnology* 2012, **168(5)**: 1065-1075. 2012.
8. Aldina S. S., Ihsanawati, Ernawati A. G. R. Molecular cloning of PhoR sensor domain from *Mycobacterium tuberculosis* for structure-based discovery of novel anti-tubercular. *Journal of Life Sciences* 2012, **6(3)**: 268-275. 2012.
9. Murniati A., Buchari, Gandasasmita S., Nurachman Z. Synthesis and characterization of polypyrrole polyphenol oxidase (PPy/PPO) on platinum electrode. *Research J. Pharm. Biol. Chem. Sci.*, **3(4)**: 855. 2012.



ORGANIC CHEMISTRY RESEARCH DIVISION

ORGANIC CHEMISTRY RESEARCH DIVISION

Organic Chemistry Research Group of the Faculty of Mathematics and Natural Sciences has a vision: to be the Indonesia's leading research groups in chemistry, with an international reputation for academic excellence and achievement. Its missions are: to study and develop organic chemistry with many related aspects focused on acquiring biodiversity for broadening molecular diversity regarding chemical and biological potential to the human race, as well as on developing organic synthesis to develop techniques and its applications on material science and bioscience.



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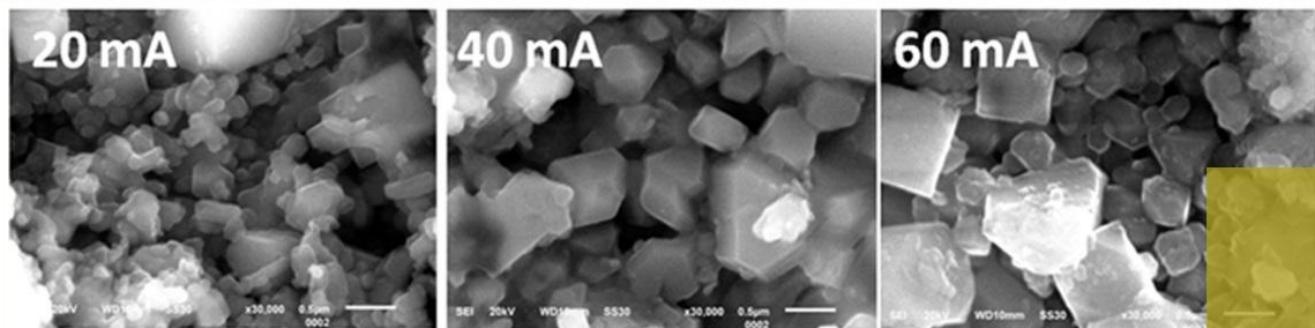
Grants

1. Yana M. Syah, Euis H. Hakim. Kajian fitokimia, sifat sitotoksik, dan sifat antioksidan senyawa-senyawa turunan fenol dari tumbuhan *Macaranga* Indonesia. *Hibah Doktor Unggulan 2012*.
2. Didin Mujahidin, Yana M. Syah. Sintesis flavonoid terprenilasi yang bersifat antioksidan. *Hibah Doktor Unggulan 2012*.
3. Yana M. Syah, Lia D. Juliawaty. Sifat antimikroba komponen terpenoid dari tumbuhan *Curcuma xanthorrhiza*. *Hibah Riset Desentralisasi 2012*.
4. Yana M. Syah, Didin Mujahidin. Antimikroba dari komponen *Macaranga trichorapa*. *Hibah Riset KK 2012*.
5. Deana Wahyuningrum. Sintesis dan karakterisasi *ionic liquid* dari turunan imidazol sebagai *green solvent* dan inhibitor korosi pada baja karbon dalam larutan NaCl 1%. *Hibah Doktor Unggulan 2012*.
6. Deana Wahyuningrum. Pengembangan metoda hidrolisis lignoselulosa menggunakan cairan ionik dan selulase. *Sinas Ristek 2012*.

Publication

1. Handayani N., Loos K., Wahyuningrum D., Buchari, Zulfikar M. A. Immobilization of *Mucor miehei* lipase onto macroporous aminated polyethersulfone membrane for enzymatic reactions. *Membranes*, **2**: 198-213. 2012.
2. Zunita M., Wahyuningrum D., Buchari, Bundjali B. Investigation of corrosion inhibition activity of 3-butyl-2,4,5-triphenylimidazole and 3-butyl-2-(2-butoxyphenyl)-4,5-diphenylimidazole toward carbon steel in 1% NaCl solution. *International J. Electrochem. Sci.*, **7(4)**: 3274-3288. 2012.
3. Tanjung M., Hakim E. H., Elfahmi, Latip J., Syah Y. M. Dihydroflavonol and flavonol derivatives from *Macaranga recurvata*. *Nat. Prod. Commun.*, **7**: 1309-1310. 2012.
4. Purkan, Ihsanawati, Syah Y. M., Retnoningrum D. S., Noer A. S., Shigeoka S., Natalia D. Novel mutations in katG gene of a clinical isolate of isoniazid-resistant *Mycobacterium tuberculosis*. *Biologia*, **67(1)**: 41-47. 2012.
5. Syah Y. M., Ghisalberti E. L. More phenolic derivatives with an irregular sesquiterpenyl side chain from *Macaranga pruinosa*. *Nat. Prod. J.*, **2**: 45-49. 2012.

6. Agustina W., Juliawaty L. D., Hakim E. H., Syah Y. M. Flavonoids from *Macaranga lowii*. *ITB Journal of Science*, **44A(1)**: 13-18. 2012.
7. Ramadhan L. O. A. N., Radiman C. L., Suendo V., Wahyuningrum D., Valiyaveettill S. Synthesis and characterization of polyelectrolyte complex N-succinyl chitosan-chitosan for proton exchange membrane. *Procedia Chemistry*, **4**: 114-122. 2012.
8. Rusnadi, Buchari, Amran M. B., Wahyuningrum D. Cerium adsorption using 1-phenyl-3-methyl-4-benzoyl-5-pyrazolone(HPMBP) loaded calcium alginate beads. *International Journal of Engineering Research and Applications (IJERA)*, **2(5)**: 496-499. 2012.
9. Ngili Y., Noer A. S., Ahmad A. S., Syukriani Y. F., Natalia D., Syah Y. M. Variants analysis of human mitochondrial genome mutation: Study on Indonesian human tissues. *International Journal of ChemTech Research 2012*, **4(2)**: 720-728. 2012.



INORGANIC AND PHYSICAL CHEMISTRY RESEARCH DIVISION

INORGANIC AND PHYSICAL CHEMISTRY RESEARCH DIVISION

Inorganic and Physical Chemistry Research Group accommodates several academic staffs of inorganic and physical chemistry, who have various research interests: coordination compounds, metal oxides, catalysts, ceramic, biodegradable polymer, biopolymer, membrane, composite, corrosion and computational and theoretical chemistry. We are responsible for delivering the teaching of inorganic and physical chemistry for undergraduate and graduate studies in ITB.

The mission of the research group:

1. to perform the teaching of inorganic and physical chemistry,
2. to make continuous improvement of teaching and learning of inorganic and physical chemistry,
3. to carry out research in the new materials and to align the various research topics in the group (coordination compounds, metal oxides, catalysts, ceramic, biodegradable polymer, biopolymer, membrane, composite, corrosion and computational and theoretical chemistry),
4. to enhance collaborations with various research groups (domestic and overseas).



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Grants

1. I Made Arcana. Polimer elektrolit dari limbah kulit udang untuk aplikasi baterai litium. *Hibah Riset KK 2012*.
2. I Made Arcana. Pemanfaatan minyak kelapa sawit untuk pembuatan polimer yang dapat terbiodegradasi (New Biodegradable Polymers). *Hibah Riset Desentralisasi DIKTI 2012*.
3. Ismunandar. BIMEVOX yang disintesis dengan menggunakan teknik liquid-prekursor: Uji kinerja sebagai elektrolit sel bahan bakar padat. *Hibah Riset KK 2012*.
4. Ismunandar. Mengungkap perubahan struktur dalam Aurivillius $Pb_{1-x}Bi_4+xTi_4-xMn_xO_{15}$ dan $Pb_{2-x}Bi_4+xTi_5-xMn_xO_{18}$: studi spektroskopi Raman. *Hibah Riset Desentralisasi DIKTI 2012*.
5. Ismunandar. Electrolytes Bimevox. *British Councils 2012*.
6. Veinardi Suendo. Ice-templating method on the synthesis of nanostructured polyaniline as high conductivity materials in organic electronics. *Hibah Riset KK 2012*.
7. Yessi Permana. Polymerizations of pine trees derived β -pinene using Zr-supported clays: heat resistant polymers from biomass. *Hibah Kerma LN dan Publikasi Internasional Batch I DIKTI 2012*.
8. Cynthia L. Radiman. Sintesis membran komposit nata de coco-Platina(NdC-Pt) sebagai elektroda sel bahan bakar metanol. *Hibah Riset dan Inovasi KK 2013*.

Publication

1. Hardian, Ismunandar. Synthesis and characterization of gd and er co-doped ceria as solid electrolyte for IT-SOFC via solid state method. *International Conference on Instrumentation, Communication, Information Technology and Biomedical Engineering (ICICI-BME)*. 2011.
2. Kilo A. L., Prijamboedi B., Martoprawiro M. A., Ismunandar. Modeling ionic conduction in γ - Bi_2VO_5 . *International Conference on Instrumentation, Communication, Information Technology and Biomedical Engineering (ICICI-BME)*. 2011.
3. Ismunandar, Rusli R., Ramdan H. Temperature dependent study of $Bi_2V_{1-x}Ga_xO_{5.5}$ ($x = 0.1$ and 0.15) oxides. *International Conference on Instrumentation, Communication, Information Technology and Biomedical Engineering (ICICI-BME)*. 2011.
4. Noviyanti A. R., Prijamboedi B., Marsih I. N., Mukti R. R., Ismunandar. Conductivity and solid state ^{29}Si NMR studies of apatite-type lanthanum silicate prepared by hydrothermal. *International Conference on Instrumentation, Communication, Information Technology and Biomedical Engineering (ICICI-BME)*. 2011.
5. Ismunandar, Indartono Y. S. Editorial introduction. Climate change and poverty in Asia: challenges and prospects. *RDD (Regional Development Dialogue)*, **32(2)**: iii-viii. 2011.
6. Setiabudi H. D., Jalil A. A., Triwahyono S., Kamarudin N. H. N., Mukti R. R. IR study of iridium bonded to perturbed silanol groups of Pt-HZSM-5 for n-pentane isomerization. *Applied Catalysis A: General*, **417-418**: 190-199. 2012.
7. Rahmawati F., Prijamboedi B., Soepriyanto S., Ismunandar. SOFC composite electrolyte based on LSGM-8282 and zirconia or doped zirconia (from zircon concentrate). *International Journal of Minerals, Metallurgy, and Material*, **19(9)**: 863-871. 2012.
8. Noviyanti A. R., Prijamboedi B., Marsih I. N., Mukti R. R., Ismunandar. Hydrothermal preparation of apatite-type phases $La_{9.33}Si_6O_{26}$ and $La_{9M1}Si_6O_{26.5}$ ($M = Ca, Sr, Ba$). *ITB Journal of Science*, **44A(2)**: 193-203. 2012.

9. Kamarudin N. H. N., Jalil A. A., Triwahyono S., Mukti R. R., Aziz M. A. A., Setiabudi H. D., Muhib M. N. M., Hamdan H. Interaction of Zn²⁺ with extraframework aluminum in HBEA zeolite and its role in enhancing n-pentane isomerization. *Applied Catalysis A: General*, **431-432**: 104-112. 2012.
10. Suendo V., Viridi S. Ab initio calculation of UV-Vis absorption spectra of a single chlorophyll *a* molecule: comparison study between RHF/CIS, TDDFT, and semi-empirical methods. *ITB Journal of Science*, **44A(2)**: 93-112. 2012.
11. Sianipar A., Amran M. B., Buchari, Arcana I. M. Effect of degree binary complex of imprint ion on the extraction of zircon ion. *IOSR Journal of Applied Chemistry (IOSRJAC)*, **1(4)**: 15-19. 2012.
12. Gonggo S. T., Radiman C. L., Bundjali B., Arcana I. M. Properties of polymer electrolyte membranes prepared by blending sulfonated polystyrene with lignosulfonate. *ITB Journal of Science*, **44A(3)**: 285-295. 2012.
13. Ramadhan L. O. A. N., Radiman C. L., Suendo V., Wahyuningrum D., Valiyaveettill S. Synthesis and characterization of polyelectrolyte complex N-succinyl chitosan-chitosan for proton exchange membrane. *Procedia Chemistry*, **4**: 114-122. 2012.
14. Suendo V., Minagawa M., Tanioka A. Chronopotentiometry study of a cation-exchange membrane in the presence of cationic surfactant in membrane surface vicinity. *Ionics*, **18**: 159-166. 2012.
15. Zunita M., Wahyuningrum D., Buchari, Bundjali B. Investigation of corrosion inhibition activity of 3-butyl-2,4,5-triphenylimidazole and 3-butyl-2-(2-butoxyphenyl)-4,5-diphenylimidazole toward carbon steel in 1% NaCl solution. *International J. Electrochem. Sci.*, **7(4)**: 3274-3288. 2012.
16. Nurbaiti S., Martoprawiro M. A., Akhmaloka, Hertadi R. The role of electrostatic interactions on Klentaq1 insight for domain separation. *Bioinformatics and Biology Insights* 2012, **6**: 225-234. 2012.
17. Triwahyono S., Jalil A. A., Mukti R. R., Musthofa M., Razali N. A. M., Aziz M. A. A. Hydrogen spillover behavior of Zn/HZSM-5 showing catalytically active protonic acid sites in the isomerization of n-pentane. *Applied Catalysis A: General*, **407**: 91-99. 2011.
18. Wustoni S., Mukti R. R., Wahyudi A., Ismunandar. Sintesis zeolit mordenit dengan bantuan benih mineral alam. *Jurnal Matematika & Sains*, **16(3)**: 158-160. 2011.
19. Mukti R. R., Kamimura Y., Chaikittisilp W., Hirahara H., Shimojima A., Ogura M., Cheralathan K. K., Elangovan S. P., Itabashi K., Okubo T. Hierarchically porous ZSM-5 synthesized by nonionic- and cationic-templating routes and their catalytic activity in liquid-phase esterification. *ITB Journal of Science*, **43A(1)**: 59-72. 2011.
20. Piluharto B., Suendo V., Ciptati, Radiman C.L. Strong correlation between membrane effective fixed charge and proton conductivity in the sulfonated polysulfone cation-exchange membranes. *Ionics*, **17(3)**: 229-238, 2011.
- 21.



ALGEBRA RESEARCH DIVISION



ALGEBRA RESEARCH DIVISION

Algebra is a branch of mathematics concerning the study of structure, relation and quantity. Elementary (highschool) Algebra provides an introduction to the basic ideas of algebra, including effects of adding and multiplying numbers, the concept of variables, definition of polynomials. Algebra is much broader, algebra covers working with symbols, variables and set elements. Addition and multiplication are viewed as general operations, and their precise definitions lead to structures such as groups, rings and fields.

The research program of Algebra Research Division ITB covers the fundamental research with emphasis on the development of the theory of module with categorical approach, and the applied research with emphasis on the application of algebraic structures in control system, cryptography, coding theory and other areas.

Workshop on Teaching Algebra and Workshop on Research in Algebra are organized and held annually in alternating since 2011. Algebra Research Seminar is held weekly, as an opportunity to exchange ideas between young algebraists.



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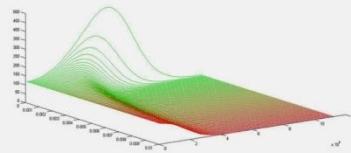
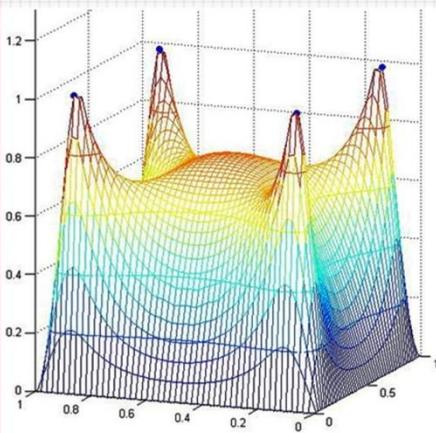
Grants

1. Intan Muchtadi-Alamsyah. Sektor Blok dengan Grup Defekt Komutatif (On Block with Abelian Defect Group). *Hibah Bersaing Dikti 2012.*
2. Intan Muchtadi-Alamsyah. Accelerating Parallelized Pollard Rho to Identify Weak Class Elliptic Curves. *Asahi Glass Foundation 2012.*
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ANALYSIS AND GEOMETRY RESEARCH DIVISION

ANALYSIS AND GEOMETRY RESEARCH DIVISION

Mathematical Analysis can sometimes be described as studies of spaces of mathematical objects based on the notion of “nearness”, or metric in particular. More popularly, it includes theory of Calculus (limit, differentiation, integration, measure) and its generalization.

At ITB, Analysis & Geometry Research Division put emphasis towards the applied side of Mathematical Analysis, without leaving the fundamentals behind. Some recent research includes analysis in n-normed spaces, fractional integral operators, analysis in seismic, energy in diffusive equations, impulsive delay equations, Hamiltonian systems.

Thematic workshop WIDE (Workshop on Integral and Differential Equations) and undergraduate student math competition MagD (Mathematical Analysis and Geometry Problem Solving Day) are organized and held annually by the Analysis & Geometry Research Division since 2006. It has since attracted participants nationally.



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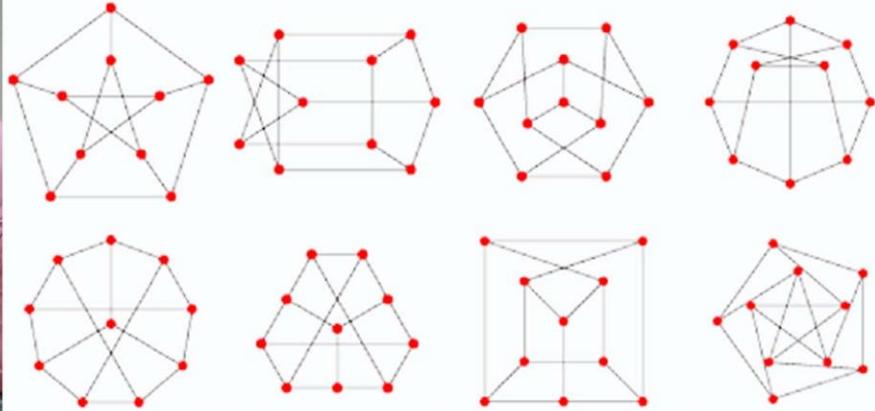
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COMBINATORIAL MATHEMATICS RESEARCH DIVISION

COMBINATORIAL MATHEMATICS RESEARCH DIVISION

We envision to be one of leading research divisions for combinatorics and graph theory in South East Asia region. We conduct researches on the cutting-edge problems in combinatorics and graph theory and carry out the implementation to various applied (real-world) problems. Promoting the use and the importance of mathematics in today's life is also our mission.

Our research focus on (1) graph extremal problems: degree/diameter problems in di(graphs) and Ramsey theory and its generalizations/variations, (2) various aspects of graph labelings and colorings, (3) distance-related concepts in graphs, (4) combinatorial designs and association schemes, (5) random graphs, (6) coding & cryptography, and (7) combinatorial applications in real-world problems or other fields. We actively conduct prestigious international conferences and workshops, such as IWOCA 2001, IJCCGGT 2003, IWOGGL 2004, ICGTIS 2007, CIMPA School 2009, and IWONT 2012. Graph Masters Workshop, an annual informal forum, has been regularly conducted since 2010. We have active and productive collaborations with the University of Newcastle Australia, Tohoku University Japan, Abdus Salam School of Mathematical Sciences GC University Pakistan, University of Twente Netherlands, Technical University of Kosice Slovakia, University of West Bohemia Czech Republic, and Polytechnic University of Catalonia Spain. Recently, we initiated the establishment of the Electronic Journal of Graph Theory and Applications (EJGTA).



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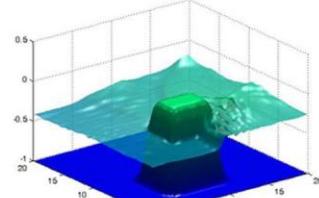
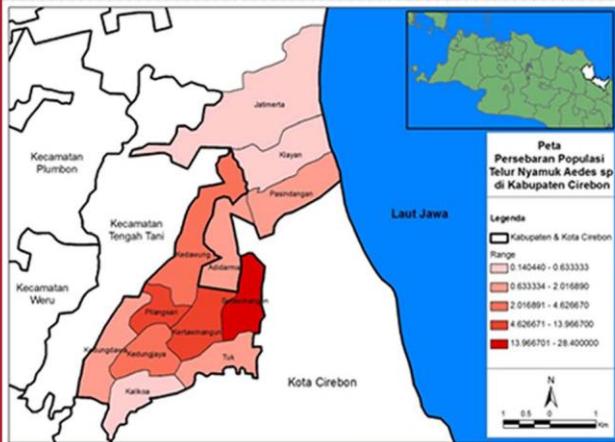
Grant

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INDUSTRIAL AND FINANCIAL MATHEMATICS RESEARCH DIVISION

INDUSTRIAL AND FINANCIAL MATHEMATICS RESEARCH DIVISION

We focus on mathematical modeling and simulation of problems that are arisen not only from mathematics itself, but also from industry. We develop an active and strong network between mathematicians and users of mathematics in solving real problems through mathematical modeling. We provide mathematical and numerical courses on finance, optimization and control theory, fluid dynamics, and mathematical biology that are offered to any graduate and undergraduate students of ITB. Workshops related to certain topics in applied mathematics and industrial problems through IMW (Industrial Mathematics Week) are held regularly. We are actively involved in developing interdisciplinary networks between mathematician and other professionals or scientists in solving real-world problems using mathematical modeling. Several linkages have been developed for many years with our partner institutions. For instance, the group has collaborated intensively with Research Consortia OPPINET (Optimization on Oil & Gas Pipeline Network) and FinanMOS (Financial Modeling, Optimization, and Simulation). Both research consortia are conducted by PPMS (Center for Mathematical Modeling and Simulation) ITB.



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| 14. Nuning Nuraini | |
| 15. Rieske Hadianti | |
| 16. Dila Puspita | |

Grants

1. Leo Harry Wiryanto. Model perambatan gelombang di atas gundukan. *Hibah Riset dan Inovasi KK ITB 2012.*
2. Sri Redjeki Pudjaprasetya. Pengaruh refleksi dan dispersi pada perambatan gelombang tsunami. *Hibah Riset dan Inovasi KK ITB 2012.*
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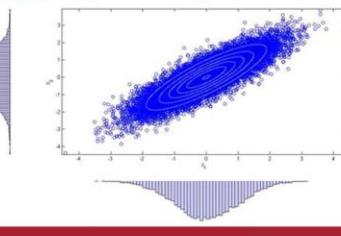
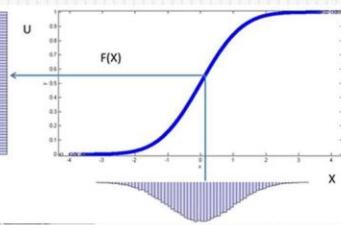
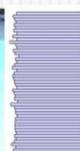
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STATISTICS RESEARCH DIVISION



STATISTICS RESEARCH DIVISION

Statistical Analysis can be described as a study of sample spaces which is based on either field or σ -algebra. The determination of probability measure is constructed by a certain field or σ -algebra. At ITB, Statistics Research Division put emphasis towards the applied side of Probability Theory and Mathematical-Statistics. Some recent research include topics in space-time analysis, copula, hidden-Markov models, financial time series, reliability process, statistical process control, statistical inverse problems, general insurance, bio-informatics, geo-statistics, warranty. In the past and at present, some members of the Statistics Research Division had and have (research) collaborations with The Insurance Bureau, Indonesia Ministry of Finance; financial institutions and insurance industries. The Statistics Research Division also conduct workshops, including training for (statistics) laboratory assistants in order to improve their knowledge and skill in Data Analysis. Two workshops on Data Analysis (WDA) and Dependency Variables (WDV) will be held annually in the future. Another future program is Undergraduate Student Statistics Competition (USSC).



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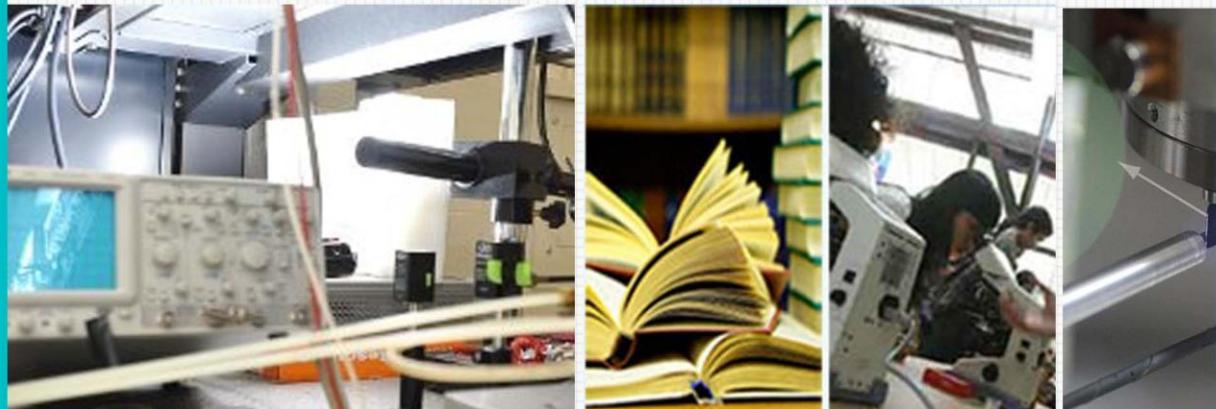
Grants

Agus Y. Gunawan, Sutawanir Darwis. Pengembangan Metode Bayesian pada Simulasi Reservoir. *Hasil Penelitian Riset dan Inovasi KK 2012.*

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2. Mukhaiyar U., Pasaribu U. S. A New Procedure of Generalized STAR Modeling using IAcM Approach. *ITB Journal of Science.* **44 A (2).** 2012.
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ELECTRONIC MATERIALS PHYSICS RESEARCH DIVISION



ELECTRONIC MATERIALS PHYSICS RESEARCH DIVISION

The scopes of Physics for Electronic Material Research Group research activities are growthand characterization of electronic materials, theoretical/numerical studies of electronic material properties, and its application for electronic and optoelectronic devices. Research areas that we are interested in are divided into four major groups that are of nano semiconductors and other nanomaterials, compound semiconductors, superconductors and oxides, and theory and simulations. The study of nano semiconductor is focused on the growth and characterization of nano silicon, carbon and its application to some electronic and optoelectronic devices such as solar cell, light emitting diode, and color sensor. Other nanomaterials are also synthesized using several physical method such as spray pyrolysis, sol gel, etc. Their applications in industry are also applied such as clarifier, purifier, Li-ion battery. In another field, the study of compound Semiconductor is focused to III-V compound semiconductor and their related materials, such as gallium, nitrate, and antimony based compound semiconductors. These deposited materials have been applied to various electronic devices such as ultraviolet and infrared detectors, gas sensor, laser diode, FET, and MOSFET. The study of superconductor and oxides are focused to superconductors, ferroelectric, pyroelectric and high dielectric materials investigation. Research on superconductor is directed to thin film high critical temperature superconductor and their application in electronic devices. The solid electrolyte fuel cell and supercapacitor application have also been studied. While, the study of theoretical and simulation is specialized to investigate the electronic material properties through theoretical analysis using computer simulation and its probability usage to experimental process of electronic devices.



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Grants

1. Khairurrijal. Pengembangan Instrumen Otomatis Triksial untuk Uji Kuat Geser Tanah. *Hibah Desentralisasi Dikti 2012.*
2. Mikrajudin A. Peningkatan Efisiensi Sel Surya Ukuran Besar Menggunakan Jembatan Logam Ukuran Nanometer. *Hibah Desentralisasi Dikti 2012.*
3. Euis Sustini. Studi Penumbuhan IZO (Indium Zinc Oxide) denganTeknik Spray Pyrolysis Sebagai Material Transparent Conducting Oxide (TCO) Pada Sel Surya. *Hibah Riset dan Inovasi KK 2012.*
4. Fery Iskandar. Fabrikasi BCNOSiO₂ Nanokomposit Phoshor untuk Aplikasi Lampu LED Putih. *Hibah Riset dan Inovasi KK 2012.*
5. Pepen Arifin. Studi Injeksi dan Transport Spin Elektron Dalam Struktur TiO₂ : Co/TiO₂/TiO₂ : Co. *Hibah Riset dan Inovasi KK 2012.*
6. Khairurrijal. Sintesis Nanopartikel Metal Oksida yang Homogen Sebagai katalis untuk Menurunkan Viskositas Minyak Berat. *Hibah Riset dan Inovasi KK 2012.*
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THEORETICAL HIGH ENERGY PHYSICS AND INSTRUMENTATION RESEARCH DIVISION



FMIPA

THEORETICAL HIGH ENERGY PHYSICS AND INSTRUMENTATION RESEARCH DIVISION

Research activities in the Theoretical High Energy Physics and Instrumentation Division are grouped into two main streams of research: researches in theoretical aspects of fundamental physics and researches in physical instrumentation. The first research stream concentrates on theoretical high energy physics, the frontier of physics in understanding of fundamental nature. The topics considered by members of the group include, among others, Einstein general relativity and other models of gravity, quantum field and gauge theory, topological gauge theory, supersymmetry, supergravity, superstring and brane world as well as analytical and numerical studies in integrable and dynamical systems. The second research stream weighs on the development of sensors and systems of instrumentation. This kind of research is very important in many aspects, including supporting research experiments in various research areas. The group develops, among others, sensors, imaging and signal processing, bioinstrumentation and also instrumentation for research and education purposes.



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Grants

- Agus Suroso. Stabilitas Model Universal Extra Dimension Lima Dimensi Dengan Kopling Derivatif Medan Skalar. *Program Riset Peningkatan Kapasitas IT 2012.*
- Bobby E. Gunara. Geometri Ruang Waktu Stasioner Berdimensi Tinggi. *Riset Inovasi dan KK ITB 2012.*
- Bobby E. Gunara. Rigit Limit Dari Solusi BPS Dalam N=2 Supergravitasi Terkopel Multiplet Materi. *Program Riset Hibah Kompetensi DIKTI 2012.*
- Suprijadi. Robot Pengintai Berbasis Citra Stereovision. *Riset Inovasi dan KK ITB 2012.*
- Triyanta. Radiasi Hawking Dari Lubang Hitam Dengan Metrik Reissner-Nordstrom-Vaidya. *Riset Inovasi dan KK ITB 2012.*
- Triyanta. Hamburan Medan Materi oleh Medan Gravitasi dalam Teleparallel Gravity. *Program Doktor Unggulan IMHERE 2012.*
- Mitra Djamal. Disain dan Pengembangan Sensor Momen Gaya Berbasis Koil Datar. *Riset Inovasi dan KK ITB 2012.*
- Mitra Djamal. Pengembangan Material Giant Magnetoresistance (GMR) Baru Berbasis Material Organik dan Aplikasinya Untuk Sensor Medan Magnet. *Program Riset Hibah Kompetensi DIKTI 2012.*
- Mitra Djamal. Desain dan Pengembangan Sistem Pembangkit Listrik Portable Berbasis Tenaga Angin dan Tenaga Surya. *Program PkM DIKTI 2012.*
- Freddy P. Zen. Skenario Universal Extradimensions Lima Dimensi Dengan Kopling Derivatif Nonminimal Medan Skalar. *Riset Inovasi dan KK ITB 2012.*
- Freddy P. Zen. Mekanisme Hosotani Pada Universal Extra Dimensions (UED) Lima Dimensi. *Program Desentralisasi DIKTI ITB 2012.*
- Wahyu Hidayat. Geometri Statis Dalam Teori Einstein-Maxwell-Higgs Berdimensi Tinggi. *Program Desentralisasi DIKTI ITB 2012.*

Publication

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PHYSICS OF MAGNETISM AND PHOTONICS RESEARCH DIVISION



PHYSICS OF MAGNETISM AND PHOTONICS RESEARCH DIVISION

This group consists of two subgroups with fairly different research topics. Magnetic subgroup deals with magnetic, thermopower, dilute magnetic semiconductor, and strongly correlated electron system. Whereas, photonics subgroup focuses on theoretical and numerical study of periodic system and photonic crystal-based devices as well as experimental study of organic-based optical laser, amplifier, and nonlinear optical materials as well. Researches in photonic material and technology are focused on the development of photonic and nonlinear optical materials, waveguide based optical periodic systems, light emitting sources for applications in telecommunication/information technology as well as optical sensors. Meanwhile, researches in magnetic materials and technology are focused on the development of superconductors, dilute magnetic semiconductors (DMS), transition metal oxides for applications in frictionless magnetic bearing, superconducting magnetic energy storage (SMES), fault current limiter, spintronics and thermoelectric power source. Our research is intertwined between theories, experiments and modeling by emphasizing analyses of experimental results based on theoretical model as well as computational and simulation results.



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Grants

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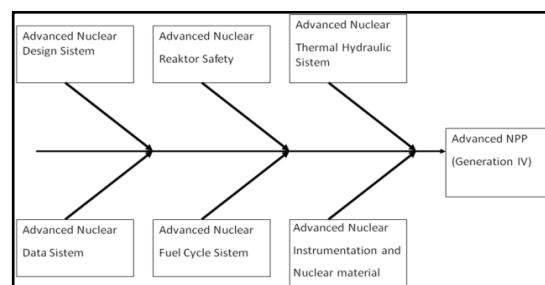


NUCLEAR PHYSICS AND BIOPHYSICS RESEARCH DIVISION



NUCLEAR PHYSICS AND BIOPHYSICS RESEARCH DIVISION

Nuclear Physics and Biophysics research division consists of two sub-division, namely Nuclear Physics sub-division and Biophysics sub-division. Nuclear Physics sub-division mainly studies several aspects of nuclear physics and its applications for research and development of the advanced nuclear power plants, especially Generation IV reactors. Generation IV reactors have particular characteristics, such as inherent safety, highly economic, nuclear waste burning capability, and ability to utilize the natural nuclear fuel effectively and efficient. Roadmap of Nuclear Physics sub-research division can be summarized in the following diagram.



Biophysics sub-division studies the physical processes in bio-system (molecule, cell, and organ) using several quantitative methods and measurements. Main research topics of this sub-research division are: molecular biophysics, membrane biophysics, radiation biophysics, and medical physics.



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Grants

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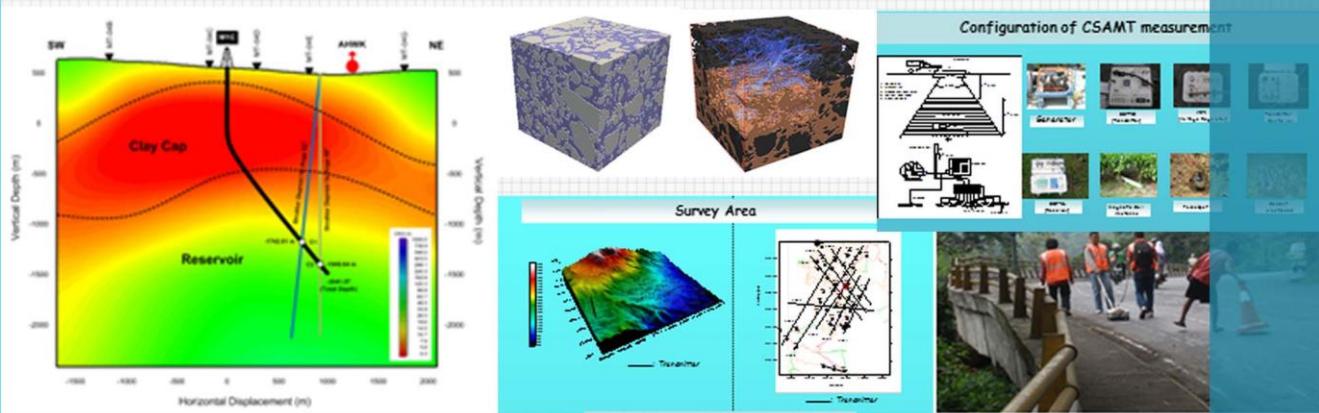
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PHYSICS OF EARTH AND COMPLEX SYSTEMS RESEARCH DIVISION



PHYSICS OF EARTH AND COMPLEX SYSTEMS RESEARCH DIVISION

The Physics of Earth and Complex Systems Division at ITB concern on complexity of the physical system and its response. By imposing the central paradigm namely complex system to the physical concepts, common tools such as numerical methods, expert system and symbolic manipulation, nonlinearity and robust prediction, as well as fuzzy logic and artificial neural network are applied to solve the related problems.

Recently, the main research activities focused on the two main issues concerning the national energy survival and mitigation of the natural disaster. Those include electromagnetic technology for exploration, fluid dynamics and rock physics, as well as seismicity.

An international conference with the theme “Modeling and Inversion in Earth and Complex Systems” is being held on July this year. Reputable invited speakers on the related topic are joining the conference.



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Grants

1. Doddy Sutarno. Investigasi Patahan Aktif dengan Metode Magnetotelurik Sebagai Sarana Dalam Mitigasi Bencana Alam Gempa Bumi. *Program Riset Doktor Unggulan 2012*.
2. Doddy Sutarno. Pemodelan Elemen Hingga Respon Magnetotelurik Berbasis Elemen Tepi. *Riset dan Inovasi KK 2012*.
3. Doddy Sutarno. Pengembangan metoda pemantauan aktivitas gunungapi berdasarkan pada sifat listrik dan magnetik. *Hibah bersaing 2012*.
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