

## ANNUAL REPORT (January 1 – December 2011)

**LABORATORY:** Condensed Matter Physics Laboratory (CMPL)

### SUMMARY

The Condensed Matter Physics Laboratory Semiconductor Group (CMPL Semicon) is one of the two clusters of the five research laboratories/groups of the National Institute of Physics. In the Past, CMPL Supercon has focused its research only on the fabrication and characterization of high temperature superconductors (HTSCs). Today, the laboratory researches done focuses on designing, fabricating, characterizing and testing of electronic devices suited for RF application.

The Condensed Matter Physics Laboratory Superconductor Group (CMPL Supercon) is one of the two clusters of the five research laboratories/groups of the National Institute of Physics. This year, the research program will find and explore novel routes for the synthesis of Zinc Oxide nano particles and characterize these particles according to their electro-optic (UV), Semiconducting, Spectroscopic characteristics and Photocatalytic properties. It will attempt to produce new habits and structures will be characterized as well. The program also aims to set up a nano manipulation and nanomaterials probing capability. This test platform will attempt to find routes that control growth of particular habits and/or structures.

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C. MS Physics	2
D. MS Material Science And Engineering	2
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<b>IV. Members and apprentices:</b>	
A. BS Physics	6
B. BS Applied Physics	19
C. MS Physics	16
D. MS Material Science And Engineering	10
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## I. Research Projects (Funded):

- 1 Fabrication of Titania Nanotubes (TNTs) from RF-Sputtered Titanium Films, FUNDING AGENCY: University of the Philippines Office of the Vice Chancellor for Research and Development (OVCRD), AMOUNT: PhP 300,000.00
- 2 Fabrication of Bow-tie Photoconductive Antenna in IR-PLD Grown High Tc Superconducting Thin Films, FUNDING AGENCY: University of the Philippines Office of the Vice Chancellor for Research and Development (OVCRD), AMOUNT: PhP 60,000.00
- 3 Magnetic Susceptibility Measurement in a YBCO Superconductor under low AC and DC Magnetic Field, FUNDING AGENCY: University of the Philippines Office of Vice Chancellor for Research and Development (OVCRD), AMOUNT: PhP 30,000.00
- 4 Development of an Ultra-high Temperature Chemical Vapor Deposition System, FUNDING AGENCY: National Research Council of the Philippines (NRCP), AMOUNT: PhP 501,650.00
- 5 Infrared Pulsed Laser Deposition of Y-doped BSCCO, FUNDING AGENCY: National Research Council of the Philippines (NRCP), AMOUNT: PhP 514,620.00
- 6 Nanostructures for Solar Cell Applications PROGRAM TITLE: Nanostructured Solar Energy Devices SUB-PROGRAM: Solid State Based Solar Cells with Nanoparticles and Graphene, FUNDING AGENCY: Department of Science and Technology (DOST) Grants-in-Aid, University of the Philippines, AMOUNT: PhP 6,130,592.00
- 7 Transparent Electrodes for Solar Cell Applications PROGRAM TITLE: Nanostructured Solar Energy Devices SUB-PROGRAM: Solid State Based Solar Cells with Nanoparticles and Graphene, FUNDING AGENCY: Department of Science and Technology (DOST) Grants-in-Aid, University of the Philippines, AMOUNT: PhP 5,816,192.00
- 8 GaAs-based solar cell devices PROGRAM TITLE: Nanostructured Solar Energy Devices SUB-PROGRAM: Solid State Based Solar Cells with Nanoparticles and Graphene, FUNDING AGENCY: Department of Science and Technology (DOST) Grants-in-Aid, University of the Philippines, AMOUNT: PhP 8,043,392.00

## II. Publications:

### A. ISI-Journals

- 1 *J De Vero, J Vitug, GR Blanca, W Garcia and R Sarmago*, "Stoichiometric transfer of material in the infrared by infrared (1064 nm) pulsed laser deposition of Y doped Bi-2212 films, *Physica C* 47, 378-383, June, 2011.
- 2 *J Vitug, J De Vero, GR Blanca, R Sarmago and W Garcia*, "Stoichiometric transfer of material in the infrared pulsed laser deposition of yttrium doped Bi-2212 films" accepted for publication, *Journal of Applied Spectroscopy*, Vol. 78. No.6, November, 2011.
- 3 *Elmer Estacio, Satoru Takatori, Minh Hong Pham, Takashi Yoshioka, Tomoharu Nakazato, Marilou Cadatal-Raduban, Toshihiko Shimizu, Nobuhiko Sarukura, and Masanori Hangyo, Christopher T. Que, Masahiko Tani, Tadataka Edamura, Makoto Nakajima, John Vincent Misa, Rafael Jaculbia, Armando Somintac, and Arnel Salvador* "Intense terahertz emission from undoped GaAs/n-type GaAs and InAs/AlSb structures grown on Si substrates in the transmission-geometry excitation", *Applied Physics B: Lasers and Optics* Accepted: January 11 2011
- 4 *Michelle F. Bailon-Somintac, Jasher J. Ibanez, Rafael B. Jaculbia, Regine A. Loberternos, Michael J. Defensor, Arnel A. Salvador, Armando S. Somintac*, "Low temperature photoluminescence and Raman phonon modes of Au-catalyzed MBE-grown GaAs-AlGaAs core-shell nanowires grown on a pre-patterned Si (1 1 1) substrate"(2011) *Journal of Crystal Growth* 314 (2011) 268-273.

Takashi Yoshioka, Satoru Takatori, Pham Hong Minh, Marilou Cadatal-Raduban, Tomoharu Nakazato, Toshihiko Shimizu, Nobuhiko Sarukura, Elmer Estacio, John Vincent Misa, Rafael Jaculbia, Michael Defensor, Armando Somintac, and Arnel Salvador, "Terahertz emission from GaAs films on Si(100) and Si(111) substrates grown by molecular beam epitaxy", Journal of Infrared, Millimeter, and Terahertz Waves, Accepted: January 17 2011

#### B. Local (Peer Reviewed) Samahang Pisika ng Pilipinas

- 1 R. Payod, J.J. Ibanez, and A. Somintac, "Simulation of Aluminum Gallium Arsenide/Gallium Arsenide (AlGaAs/GaAs) High Electron Mobility Transistor (HEMTs) energy band diagram with spacer using shooting method."
- 2 J. R. Abat, A. Salvador, and A. Somintac, "X-ray diffraction study of  $\text{Al}_x\text{Ga}_{1-x}\text{As}/\text{GaAs}$  bilayer superlattice."
- 3 N.G. Saplagio, A. Mabilangan, A. Salvador, and A. Somintac, "Fabrication of tunable optical transmission filters based on porous silicon."
- 4 E. Leynes, H. Husay, C. Andrew Borja, A. Salvador, and A. Somintac, "Electrodeposition of Au nanostructure array using Anodized Aluminum Oxide for template transfer."
- 5 F.C. Awitan, M.A. Tumanguil, N.I. Cabello, M.H. Balgos, J.P. Afalla, J de Vero, A. Somintac, and A. Salvador, "Low temperature growth of indium oxide ( $\text{In}_2\text{O}_3$ ) nanoarrows and nanowires on glass substrates."
- 6 M.H. Balgos, R. Jaculbia, M. Defensor, J.J. Ibanez, M. Bailon-Somintac, A. Salvador, and A. Somintac, "Measurements of carrier lifetimes of GaAs/AlGaAs core-shell nanowires on Si(111) substrates."
- 7 J. Porquez, K. Omambac, J.D. Vasquez, J.P. Afalla, M. Defensor, A. Somintac, and A. Salvador, "Molecular beam epitaxy growth of GaAs quantum dots through modified droplet epitaxy."
- 8 R. Simon, R.C. Roca, P.L.A. Hilario, R. Vitacol, N.I. Cabello, and A. Somintac, "Investigation of the dependence of the photoluminescence lifetime of GaAs/AlGaAs multiple quantum wells on the number of wells."
- 9 J. P. Afalla, M.H. Balgos, R. Payod, S. Vizcara, A. Salvador, and A. Somintac, "Low temperature photoluminescence of single quantum wells."
- 10 R. Jaculbia, M.H. Balgos, M. Defensor, K. Omambac, A. Salvador, and A. Somintac, "Modified rate equations model for tunneling in GaAs/AlGaAs asymmetric coupled quantum wells."
- 11 E.A. Prieto, A.M. Laganapan, M.H. Balgos, C. Que, E. Estacio, K. Yamamoto, M. Tani, A. Somintac, and A. Salvador, "Characterization of unannealed and annealed LTG:GaAs grown on SI-GaAs substrate for THz applications."
- 12 J.M. Presto, J.D. Vasquez, and A. Somintac, "GaAs p-i(multiple quantum well)-n on glass substrate by epitaxial lift-off for photovoltaic applications."
- 13 C. Sadia, M.A. Tumanguil, A.M. Laganapan, A. Somintac, E. Estacio, C. Que, K. Yamamoto, M. Tani, and A. Salvador, "MBE-growth and x-ray diffraction of GaAs on p-GaSb(100) for intense terahertz emission."
- 14 A.M. Laganapan, M.A. Tumanguil, and A. Somintac, "Strain investigation of InGaAs/GaAs multiple quantum wells by reciprocal space mapping."
- 15 C. Ceniza, O. Semblante, N. Mangila, R. Daclan and A. Somintac, "Growth of Indium Aluminum Nitride using Reactive RF-Magnetron Sputtering."
- 16 M Lao and R Sarmago, "DC Field Dependence of the Intragranular response of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  Superconductor probed thru AC Magnetic Susceptibility Measurement".
- 17 FI de Vera, J Azares, S Crosby, FC Awitan, A Somintac and R Sarmago, "Seedless electroplating on a rectangular etched grating on n-Si/undoped silicon substrate".
- 18 FI de Vera, FC Awitan and R Sarmago, "X-ray beam splitter produced via UV lithography and chemical wet etching".
- 19 MM Exconde and R Sarmago, "One-dimensional zinc oxide nanostructures synthesized using direct current oxidation".
- 20 MF de Leon and R Sarmago, "Effects of Gd and Y Doping in  $\text{BaFeO}_{3-y}$ ".
- 21 MA Duldulao and R Sarmago, "Effects of iron-doping on Ca site of Bi-2212 superconductor films grown via sedimentation melt quench technique".
- 22 B Villafior, JI Bugante, MA Duldulao and R Sarmago, "Phase compositions on a melt-quenched and post-annealed Bi-2212 sedimentation film".
- 23 J Elvina and R Sarmago, "Effects of increasing Fe on structural and morphological properties of  $\text{BaPb}_{1-y}\text{Fe}_y\text{O}_3$ ".
- 24 MA Zosa and R Sarmago, "An alternative model to simulate the effects of Au vacancies in  $\text{AuCu}_{3-x}$  alloys on the X-ray diffraction patterns".

- 25 *JJ Bugante, MA Zosa, B Villafior and R Sarmago*, "Resulting thicknesses of Bi-2212 superconducting sedimentation films in relation to the dispersion radius as deposition parameter: a statistical approach".
- 26 *S Namuco, M Lao and R Sarmago*, "Magnetic behavior of manganese oxide powder obtained using AC magnetic susceptibility measurement".
- 27 *LA Fulgencio and R Sarmago*, "Insights on EPD Process by statistical analysis of size distribution on As-deposited grains on a substrate surface".
- 28 *J Tacneng, LA Fulgencio and R Sarmago*, "Transformation of  $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+\delta}$  films deposited on (110) MgO due to melting, quenching and post-Annealing".
- 29 *AM Geronimo, M Lao and R Sarmago*, "Fundamental and third harmonics AC susceptibility with applied DC field".
- 30 *B Singidas, A Santos and R Sarmago*, "Adhesion force measurement on ZnO microrods on silicon surface during atomic force microscope probe manipulation".
- 31 *MF Permejo B Singidas and R Sarmago*, "Manipulation and adhesion force measurements of carbothermal grown ZnO nanorods on Si (111) wafer".
- 32 *MJ Empizo, MF Permejo, B Singidas and R Sarmago*, "Surface morphological and electrical characterization of ZnO prepared by direct thermal oxidation".
- 33 *MJ Empizo and R Sarmago*, "Direct thermal oxidation of Zn metal foils".
- 34 *R Vargas, K Yamanoi, MC-Raduban, R Sarmago, T Shimizu and N Sarukura*, "Improved ultrafast free-excitonic luminescence of ZnO microcrystals grown by carbothermal reduction method".
- 35 *M Uy, RP Vilao and R Sarmago*, "Electrophoretic deposited  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  films".
- 36 *L Bambao and R Sarmago*, "Superconducting  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  film fabrication via sedimentation deposition and liquid phase annealing".
- 37 *AC Santiago and R Sarmago*, "Effect of doping manganese on strontium-site of  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ".
- 38 *R Lopez and R Sarmago*, "Mn<sup>2+</sup> doping on the Ba-site of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  system: structural and electrical characteristics".
- 39 *J De Vero, R Lopez, W Garcia and R Sarmago*, " $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  films prepared by IR Nd:YAG PLD".

### C. International Conference Proceedings

- 1 *J De Vero, GR Blanca, J Vitug, W Garcia, R Sarmago*, "Infrared Pulsed Laser Deposition of Y-doped BSCCO Superconducting thin films", *Advances in Optoelectronics and Micro/Nano-Optics (2010 AOM)*, OSA-IEEE-COS, Guangzhou, China, February 2011.
- 2 *R.O. Gonzales, A. Mabilangan, N.I. Cabello, and A. Somintac*, "Refractive Index Manipulation of Porous Silicon for Coating Applications", *International Conference on Materials for Advanced Technologies (ICMAT) 2011*, Singapore, July, 2011.
- 3 *N.I. Cabello, R.O. Gonzales, A. Mabilangan, J. Gimeno, R. Lopez, A. Salvador, and A. Somintac*, "Low Reflectance Porous Silicon Layer", *International Conference on Materials for Advanced Technologies (ICMAT) 2011*, Singapore, July, 2011.
- 4 *M.H. Balgos, M. Defensor, R. Jaculbia, J.J. Ibanes, R. Loberternos, F.C. Awitan, M.A. Tumanguil, R. Simon, A. Salvador, and A. Somintac*, "Time-resolved Photoluminescence Spectroscopy of Core-shell GaAs/AlGaAs Nanowires Grown on Si(100) and Si(111) Substrates", *International Conference on Materials for Advanced Technologies (ICMAT) 2011*, Singapore, July, 2011.
- 5 *J.J. Ibanes, K.A. De Las Alas, J.D. Vasquez, M.H. Balgos, R. Jaculbia, M. Defensor, R. Loberternos, A. Salvador and A. Somintac*, "Temperature-dependent Photoluminescence Spectroscopy of Gallium Arsenide-Aluminum Gallium Arsenide Core-shell Nanowires on Si(100) and Si(111) Substrates", *International Conference on Materials for Advanced Technologies (ICMAT) 2011*, Singapore, July, 2011.
- 6 *R. Daclan Jr., E.A. Dilla, C. Ceniza, N.C. Cantre, A. Somintac and A. Salvador*, "Controlled Lateral and Angular Growth of Titanium Dioxide Nanotubes on Thin Films", *International Conference on Materials for Advanced Technologies (ICMAT) 2011*, Singapore.

- 7 E.A. Dilla, R. Daclan Jr., C.A. Borja, C. Ceniza, J.P. Afalla, A. Somintac and A. Salvador, "Growth of Anodic Titanium Dioxide Nanotubes on Different Substrates", International Conference on Materials for Advanced Technologies (ICMAT) 2011, Singapore, July, 2011.
- 8 MJ Empizo, J De Vero, R Lopez, W Garcia and R Sarmago, "Infrared Pulsed Laser Deposition of Transparent Zinc Oxide Films", International Conference on Materials for Advanced Technologies (ICMAT) 2011, Singapore, July, 2011. ISBN 978- 981-877-0.
- 9 A Jasmin, J De Vero, L Dasallas, W Garcia and R Sarmago, "Synthesis of Fe<sub>2</sub>O<sub>3</sub> nanostructures by carbothermal oxidation of Fe spheroidal particulates on Si substrates generated by infrared pulsed laser" 5th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management, (HNICEM), Manila, Philippines, March 2011, ISSN 1908-6180.

### III. Graduates:

#### A. BS Physics

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|-------------------------------|---|
| 1. Renebeth B. Payod (March)  | Thesis title: "Modeling of the energy band diagram of $A_{0.3}Ga_{0.7}As/GaAs$ HEMT layer", Adviser: Dr. Armando S. Somintac  |
| 2. Clairecynth C. Yu (March)  | Thesis title: "Using vertical scanning interferometry in optimizing interdigitated capacitor", Adviser: Dr. Arnel A. Salvador   |
| 3. Shiela P. Crosby (October) | Thesis title: "Fabrication and characterization of low cost $n^+$ emitter silicon photovoltaic device using $H_3PO_4$ as diffusion precursor", Adviser: Dr. Armando S. Somintac |

#### B. BS Applied Physics

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|--------------------------------------|---|
| 1. Arvin I. Mabilangan (March)       | Thesis title: "Optical reflectivity of distributed bragg reflectors based on porous silicon", Adviser: Dr. Armando S. Somintac  |
| 2. Celestino Andrew M. Borja (March) | Thesis title: "Enhancement of Anatase Titanium Dioxide (TiO <sub>2</sub> ) nanotubes through heat treatment of parent Titanium (Ti) films", Adviser: Dr. Armando S. Somintac                    |
| 3. Dane Lovelle D. Gonzales (March)  | Thesis title: "Strain Evaluation of InGaAs/GaAs multiple quantum wells by reciprocal space mapping", Adviser: Dr. Armando S. Somintac   |
| 5. Jonathan Ray Abat (March)         | Thesis title: "Kinematical model of X-ray diffraction on multilayered superlattices", Adviser: Dr. Armando S. Somintac  |
| 6. Kaye Ann C. De Las Alas (March)   | Thesis Title: "Temperature dependent photoluminescence spectroscopy of Gold catalyzed $Al_xGa_{1-x}As/GaAs$ core shell nanowires on Silicon (100) Substrates", Adviser: Dr. Armando S. Somintac |
| 7. Eugenio Leynes (October)          | Thesis Title: "Surface enhanced Rman scattering from electrodeposited Au nanostructure array on AAO template", Adviser: Dr. Armando S. Somintac   |

#### C. MS Physics

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| 1. Rafael B. Jaculbia | Thesis title: "Tunneling in GaAs/ $Al_xGa_{1-x}As$ Asymmetric Double Quantum Wells Observed via 300K Time Resolved Photoluminescence Spectroscopy", Adviser: Dr. Armando S. Somintac |
| 2. Jeremy G. Porquez  | Thesis title: "Fabrication of Gallium Arsenide Quantum Dots", Adviser: Dr. Arnel A. Salvador   |

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|----------------------------------|--|
| 3. Aleena Maria K. Laganapan     | Thesis title: "Strain Evaluation of InGaAs/GaAs Multiple Quantum Wells by Reciprocal Space Mapping", Adviser: Dr. Armando S. Somintac  |
| 4. Elizabeth Ann P. Prieto (May) | Thesis title: "Growth and characterization of low temperature grown GaAs on semi-insulating and n <sup>+</sup> GaAs substrates via molecular beam epitaxy for terahertz applications", Adviser: Dr. Arnel A. Salvador          |
| 5. Jan Isaac Bugante (May)       | Thesis title: "Investigation of the Surface Morphological Quality of Submicron-thin Bi-2212 Sedimentation Films", Adviser: Dr. Roland Sarmago  |
| 6. Mayraluna L. Lao (October)    | Thesis Title: "Inter- and intragranular response in the complex magnetic susceptibility of YBa <sub>2</sub> Cu <sub>3</sub> O <sub>7</sub> superconductor under exposed AC and DC magnetic field", Adviser: Dr. Roland Sarmago |

#### D. MS Material Science And Engineering

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|-------------------------------------|---|
| 1. Rhona Olivia M. Gonzales (March) | Thesis title: "Electrochemical fabrication of Porous Silicon", Adviser: Dr. Armando S. Somintac   |
| 2. Renato Daclan (October)          | Thesis title: "Synthesis of vertically oriented transparent Titanium Oxide (TiO <sub>2</sub> ) nanotube thin films", Adviser: Dr. Armando S. Somintac |

#### E. PhD Physics

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|------------------------------|---|
| 1. Jeffrey de Vero (October) | Thesis title: "Infrared Pulsed Laser Deposition of Superconductor Materials", Adviser: Dr. Roland Sarmago |
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### IV. Members and apprentices:

#### A. BS Physics

1. Condes, Raymond
2. Galvez, Erik Lorenzo
3. Garcia, Rome
4. Ragasa, Joseph Christopher
5. Tacneng, Jonalds
6. Zosa, Myles Allen

#### B. BS Applied Physics

1. Abrenica, Jefferson
2. Calaque, Precy Mae
3. de Leon, Mark Francis
4. Dudulao, Mel Anthony
5. Elvina, Jessmond
6. Exconde, Maria Maridel
7. Fulgencio, Louise Anne
8. Gawaran, Ma. Charmaine Joie
9. Geronimo, Ana Marie
10. Guevara, Venice Kaye
11. Husay, Horace Andrew
12. Lopez, Rusty
13. Maloles, Peter Jeffrey
14. Mata, Anna Carmela
15. Miguel, Heinritz Majella
16. Namuco, Shiello
17. Saplagio, Niel Gabriel

18. Villafior, Benjamin
19. Vizcara, Sheryl Ann

#### C. MS Physics

1. Abat, Jonathan Ray
2. Amado, Jerine
3. Azares, Jonathan
4. Balgos, Maria Herminia
5. Bambao, Leonalyn Bonagua, Zaldy Jr.
6. Cabello, Neil Irvin
7. De Las Alas, Kaye Ann
8. de Vera, Francesca Isabel
9. Empizo, Melvin John
10. Mabilangan, Arvin
11. Mailig, Rengie Mark
12. Payod, Renebeth
13. Permejo, Michael Francis
14. Santiago, Alvin Carl
15. Simon, Rhenish
16. Vargas, Ray

#### D. MS Material Science And Engineering

1. Awitan, Fritz Christian
2. Borja, Celestino Andrew
3. Ceniza, Claude
4. Dilla, Ed Adrian
5. Lopez, Roma
6. Santos, Alexandra
7. Sayson, Lucevida
8. Tumanguil, Mae Agatha
9. Uy, Mayrene
10. Yu, Clairecynth

#### E. PhD Physics

1. Afalla, Jessica Pauline
2. Blanca, Glaiza Rose
3. Bugante, Jan Isaac
4. Defensor, Michael
5. de Vero, Jeffrey
6. Guaio, Luisito
7. Ibanes, Jasher John
8. Jaculbia, Rafael
9. Laganapan, Aleena Maria
10. Lao, Mayraluna
11. Muldera, Joselito
12. Omambac, Karim
13. Presto, Jorge Michael
14. Prieto, Elizabeth Ann
15. Rillera, Hannah
16. Roca, Ronel Christian
17. Sadia, Cyril
18. Singidas, Bess

## V. Awards

1. De Vero, Jeffrey C, 3rd Place for Discovery, Invention and Innovation Booth for the paper "High Tc superconducting lms prepared by 1064 nm Nd:YAG Pulsed Laser Deposition", Philippine-American Academy of Science and Engineering, 2011.

## VI. Extension Programs:

### 1. On the Job Training

**Duration:** April to May 2008 (200hours)

**Description:** 200 hours of on the job training for the BS Physics students from different universities, as one of the requirements of their undergraduate program. The students, whose names are given below worked with the different stations of the laboratory from bulk and thin film fabrication of superconductors and ZnO, XRD, Transport, Susceptibility and AFM measurements.

**Beneficiaries:** Beniga, Abraham (MSU)

Billones, John Philip (USC)

Calleja, Mary Ann (PUP)

Crisostomo, Christian (UPLB)

Escobar, Miguel Luis (UPB)

Felix, Mark Jayson (UPB)

Fernandez, Floressa May (UPB)

Lador, Joycee Jean (MSU IIT)

Padua, Micah Ann (PUP)

Pangasinan, Jamaica (UPB)

Racman, Sittie Raineh (UPB)

Ramos, Mc Guillis Kim (UPB)

Reysoma, Raphael Dan Alan (UPLB)

Salazar, Hernanie Jr. (PUP)

Sanico, Fedil II, (MSU IIT)

Santoya, Amos (USC)

Soriano, Ma. Rebecca (UPB)