

**Research Accomplishments of the Condensed Matter Physics Laboratory,
National Institute of Physics
01 January 2019 – 31 December 2019**

ARNEL A. SALVADOR, Ph. D.
CMPL Program Coordinator
20 January 2020

<p>I. Executive Summary</p> <p>A. Activities of the Research Group</p> <p>Organization</p> <table border="0"> <tr> <td>Professor: 4</td> <td>Apprentices (NIP-Students): 3</td> </tr> <tr> <td>Asst. Professor: 1</td> <td>Apprentices (Non-NIP): 16</td> </tr> <tr> <td>REPS: 2</td> <td>Undergraduate Members: 25</td> </tr> <tr> <td>Instructors: 5</td> <td>Graduate Members: 63</td> </tr> <tr> <td>Adjunct Researchers: 2</td> <td></td> </tr> </table> <p>Mentoring</p> <table border="0"> <tr> <td>BS Physics: 8</td> <td>Number of Graduates: 7</td> </tr> <tr> <td>BS Applied Physics: 17</td> <td></td> </tr> <tr> <td>MS Physics: 8</td> <td></td> </tr> <tr> <td>PhD Physics: 11</td> <td></td> </tr> <tr> <td>MS MSE: 31</td> <td></td> </tr> <tr> <td>PhD MSE: 13</td> <td></td> </tr> </table>	Professor: 4	Apprentices (NIP-Students): 3	Asst. Professor: 1	Apprentices (Non-NIP): 16	REPS: 2	Undergraduate Members: 25	Instructors: 5	Graduate Members: 63	Adjunct Researchers: 2		BS Physics: 8	Number of Graduates: 7	BS Applied Physics: 17		MS Physics: 8		PhD Physics: 11		MS MSE: 31		PhD MSE: 13	
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<p>B. Research Highlights</p> <p>Papers published/accepted for publications in international peer-reviewed journals: 10</p> <p>Papers published in local journals: 14</p> <p>International conference presentations</p> <p>Without full paper: 14</p> <p>Local conference papers</p> <p>With full paper: 42</p> <p>Without full paper: 8</p> <p>NIP funded projects: 3</p> <p>Non-NIP funded projects:</p> <p>Major equipment acquired/upgraded: 15</p> <p>Research travels abroad: 35</p> <p>Visiting researchers: 12</p> <p>MOA's entered with foreign institutions: 0</p>																						
<p>C. Extension Work Highlights</p> <p>Research Interns/ OJT's (Non-NIP), for trainings held at NIP:</p>																						
<p>D. Main Challenges Encountered and Proposed Solutions</p> <p>Supplies</p> <p>Procurement</p>																						

E. Positions of Responsibility Held

National: 2

II. Technical Report**A. Activities of the Research Group**

The Condensed Matter Physics Laboratory (CMPL) have 5 professors, 1 assistant professor, 2 REPS, 5 instructors, 2 adjunct researchers, 3 apprentices, 25 graduate and 60 undergraduate students for 2019. There are 6 students who graduated in MS MSE, 1 in PhD MSE and 1 in BS Applied Physics. CMPL was able to publish 10 peer-reviewed scopus-indexed manuscripts, 14 international conference presentations (without full paper), 43 local conference papers (with full paper), and 8 local conference papers (without full paper). A total of ₱ 48,131,970.12 of major equipment outlay has been purchased for research. Research travels abroad by NIP-CMPL faculties and students were taken in Japan, Thailand, Vietnam, and USA. The CMPL also hosted both international visiting researchers and local OJT interns. Major problems in purchasing supply and equipment were encountered.

1. Organization**Group Members****Regular Members**

Arnel A. Salvador, Ph.D. (Professor)
 Armando S. Somintac, Ph.D. (Professor)
 Elmer S. Estacio, Ph.D. (Professor)
 Roland V. Sarmago, Ph.D. (Professor)
 Vallerie Ann I. Samson, Ph. D. (Asst. Prof)
 Alexander De Los Reyes, M. Sc. (Faculty)
 Neil Irvin Cabello, M. Sc. (Faculty)
 Horace Andrew Husay, M. Sc. (Faculty)
 Angelo P. Rillera (Faculty)
 Jerome C. Taguba (Faculty)
 Hannah R. Bardolaza, M.Sc. (REPS)
 Bess G. Singidas, M. Sc. (REPS)

Adjunct Researcher

Elizabeth Ann Prieto, Ph.D. (Asst. Prof, MSEP)
 Cyril Sadia-Galang, Ph.D. (Asst. Prof, MSEP)

Student Member**PhD Physics (11)**

Singidas, Bess (3+)
 Balgos, Maria Herminia (3+)
 Cabello, Neil Irvin (3+)
 de Vera, Francesca Isabel (3+)
 De Los Reyes, Alexander (3+)
 Lumantas, Deborah Anne (3+)
 Taguba, Jerome (4)
 Husay, Horace Andrew (3)
 Catindig, Gerald Angelo (2)
 Rillera, Angelo (2)
 Solibet, Erick John Carlo (2)

PhD MSE (13)

Bardolaza, Hannah R (3+)
 Rosete, Maricar (5)
 Copa, Vernalyn (4)
 Faustino, Maria Angela B. (4)
 Tingzon, Philippe Martin (4)
 Tuico, Anthony (4)
 Café, Arven I. (3)
 Jagus, Rommel J. (2)
 Loberternos, Regine (2)
 Montecillo, Anthony (2)
 Sayson, Luce Vida (2)
 Tumanguil-Quitoras, Mae Agatha (2)

<p>MS Physics (8)</p> <p>Lopez, Rusty (2+) Tacneng, Jonalds (2+) Vistro, Victor DC Andres (2+)</p> <p>Ahmad, Al Kadeem (2+)</p> <p>Andig, Roni (2+)</p> <p>Tan, Craig Egan Allister (2+)</p> <p>Armonia, Jeremias (2) Verona, Ivan Cedrick (1)</p> <p>Undergraduates (25)</p> <p>Averell Aquino (5) Bacaoco, Miguel Yee (5) Cavite, Theo Victor A. (5) Dagumanpan, Edu James (5) Dawisan, Mark Kevin R. (5) Figuerola, Nicole (5) Galarosa, Nikko F. (5) Guingab, Aizanel B. (5) Javar, Patricia (5) Juguilon, Vince Paul P. (5) Ledesma, Anselmo Jose (5) Leonardo, Shawntel Joy (5) Llemit, Christian Loer T. (5) Llevares, Kint Ynnos B. (5) Magsayo, Lawrence Jay G. (5) Mamucud, Karen Nicole E. (5) Mataac, John Jerome G. (5) Nueva, Angelo Gabriel (5) Ong, Ysabella Cassandra F. (5) Polido III, Wilfredo Miguel A (5) Ramos, Ma. Romina Rogem V. (5) Reyes, Giselle S. (5) Salazar, Kloudene (5) Subaldo, Mark Christian G. (5) Vasquez, Ardell Justin B. (5)</p>	<p>Publico, Jairrus (1)</p> <p>MS MSE (31)</p> <p>Uy, Mayrene (2+) Ballesteros, Laureen Ida (2+) Cainglet, Michael Rey A. (2+) Pangasinan, Jamaica N. (2+) Vergara, Christopher Jude (2+) Galapia, Xyrus (2+) Bendal, Aldrin (2+) Buenafe, Debinya (2+) Mejarito, Vincent (2+) Rola, Yuta Louie (2+) Sura, Ar Jay C. (2+) Suratos, Efren (2+) Vasquez, John Daniel (2+) Ferrolino, John Paul R. (2+) Aves, Ron Darell A. (2+) Escolano, Arvin Jay (2+) Manrique, Mylenne (2+) Veloz, Raymund (2+) De Luna, Charlene (2+) Inguito, Jonah Micah L. (2+) Jose, Ameera A. (2+) Magallanes, Bee Jay (2+) Maylem, Genes P. (2+) Madula, Rogie M. (2+) Nalayog, Marvin B. (2+) Pangasinan, Jamela N. (2+) Sarmiento, Vladimir (2+) Torremoro, Jennieva Grace E. (2+) Cantor, Camille Victoria (2) Escaro, Archel (2) Valenzona, Marjorie (1)</p>
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Apprentices (3)

Cerx Lorenz Lim (5)
Michelle Celebrado

Alexander Paul Belila (5)

Organizational Summary

Regular Members	12
Student Members	
B4	7
B5	18
M1	7
M2	32
P1	1
P2	9
P3	14
Total Number of Regular Members/Student Members	100
Adjunct Researcher (Postdoctoral Researchers)	2
Apprentices (NIP)	3
Apprentices (Non-NIP)	16

2. Mentoring**Graduated 2nd Semester 2018-2019*****BS Physics******BS Applied Physics (Materials Science)******BS Applied Physics (Instrumentation)******MS Materials Science and Engineering*****Vladimir Sarmiento**

Fabrication of Porous Silicon in Photodegradation of Methylene Blue Dye

Adviser: Armando Somintac, Ph.D.

Mayrene A. Uy

Fabrication of Highly c-axis oriented YBCO Superconducting Thin Films by Sedimentation Deposition

Adviser: Roland V. Sarmago, Ph.D.

Jamaica N. Pangasinan

Spray Pyrolysis Deposition of Tin Oxide for Supercapacitor Electrode Applications

Adviser: Armando S. Somintac, Ph.D.

Debinya B. Buenafe

UV-Visible Light Induced Photodegradation of Organic Dye Using CuO/ZnO Composite Films Grown via Spray Pyrolysis Deposition

Adviser: Armando S. Somintac, Ph.D.

Clairecynth C. Yu

Ohmic Metal Contacts to Low Temperature-grown Gallium Arsenide for Terahertz Photoconductive Antenna Device Applications

Adviser: Armando S. Somintac, Ph.D.

Ameera A. Jose

Terahertz Emission of Enhancement of Gallium Arsenide Thin Film on a Porous Silicon Distributed Bragg Reflector Designed at 800 nm

Adviser: Elmer S. Estacio, Ph.D.

PhD Materials Science and Engineering**Hannah P. Rillera-Bardolaza**

Photocarrier Dynamics Studies in GaAs/AlGaAs Modulation-Doped Heterostructures Via Terahertz Emission and Modulated Reflectance Spectroscopy

Adviser: Roland V. Sarmago, Ph.D. & Elmer S. Estacio, Ph.D.

Graduated 1st Semester 2018-2019**BS Applied Physics (Materials Science)****Kloudene A. Salazar**

Structural and Optical Studies of Fe³⁺-Doped ZnO Microstructures

Adviser: Roland V. Sarmago, Ph.D.

Mentoring Summary

Course	2 nd Sem 17-18	1 st 18-19	Total
BS Physics	0	0	0
BS Applied Physics	0	1	1
MS Physics	0	0	0
PhD Physics	0	0	0
MS MSE	0	6	6
PhD MSE	0	1	1

B. Research Highlights**1. Papers published/accepted for publications in international peer-reviewed journals (10)**

- 1.) M.H. Balgos, E.A. Prieto, M. Tani, E. Estacio, A. Salvador, A. Somintac, N. Hayazawa, & Y. Kim, Atomically-resolved interface imaging and terahertz emission mechanism of gallium arsenide epilayers. *Journal of Applied Physics*, 126 (23), 235706, (2019). <https://doi.org/10.1063/1.5118815>.
- 2.) V.C. Agulto, M.J.F. Empizo, K. Kawano, K.A. Salazar, Y. Minami, K. Yamanoi, T. Shimizu, A.C.C. Yago, R.V. Sarmago, & N. Sarukura, "Combination of post-growth treatments and their effects on ZnO microrods as potential UV Phosphors," *Optical Materials*, Vol. 86, pp. 12-17. <https://doi.org/10.1016/j.optmat.2018.09.018>.
- 3.) J. Afalla, A. De Los Reyes, A. Faustino, V.D.C. Vistro, H.R. Bardolaza, G.A. Catindig, K.C. Gonzales, E.A. Prieto, J. Muldera, V.K. Mag-Usara, N.I. Cabello, V.C. Copa, J.P.

- Ferrolino, G. Torosyan, T. Furuya, H. Kitahara, A. Somintac, A. Salvador, M. Tani, & E. Estacio, "Detection performance of LT-GaAs-on-Silicon bowtie photoconductive antenna prototype," in Proceedings of the 44th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz 2019), Maison de la Chimie Paris; France, September 1-6 2019, Category number CFP19IMM-ART; Code 153046. <https://doi.org/10.1109/IRMMW-THz.2019.8874195>.
- 4.) F.I. de Vera, H.R. Bardolaza, C. Arcilla, & R. Sarmago, "Effect of In₂O₃ on the grain connectivity and superconducting behavior of Bi₂Sr_{2-x}In_xCaCu₂O_{8+d}," Springer Nature Applied Science (2019) 1:96. <https://doi.org/10.1007/s42452-018-0109-5>.
 - 5.) N.I. Cabello, P.M. Tingzon, H.A. Husay, J.D. Vasquez, R. Jagus, K.I. Patrocenio, K.C. Gonzales, G.A. Catindig, E.A. Prieto, A. Somintac, A. Salvador, & E. Estacio, "Growth and fabrication of 850 nm AlGaAs/GaAs vertical cavity surface emitting laser structure," in Proceedings of the 8th International Seminar on New Paradigm and Innovation on Natural Sciences and Its Application (ISNPINSA 2018), Semarang, Central Java; Indonesia; 26 September 26-27, 2018. Code 148936. <https://doi.org/10.1088/1742-6596/1217/1/012003>.
 - 6.) H. Bardolaza, J. Afalla, A. De Los Reyes, D.A. Lumantas, J.D. Vasquez, J. Muldera, V.K. Mag-Usara, A. Somintac, A. Salvador, M. Tani, & E. Estacio, "Efficacy of proposed 2DEG-based photoconductive antenna using magnetic bias-controlled carrier transport," Current Applied Physics, 19 (6), 756-761 (2019). <https://doi.org/10.1016/j.cap.2019.04.003>.
 - 7.) A. Jose, A. Montecillo, A. De Los Reyes, M. Bacaoco, J. Lopez, A. Café, M.A. Faustino, H.A. Husay, J.D. Vasquez, K.C. Gonzales, J.P. Afalla, V.K. Mag-Usara, H. Kitahara, M. Tani, A. Somintac, A. Salvador, & E. Estacio, "Enhanced terahertz emission of a gallium arsenide thin film on a porous silicon distributed Bragg reflector designed at 800nm wavelength," Enhanced terahertz emission of a gallium arsenide thin film on a porous silicon distributed Bragg reflector designed at 800nm wavelength", Optical Materials, 92, 335-340 (2019). <https://doi.org/10.1016/j.optmat.2019.04.028>.
 - 8.) J. Afalla, K.C. Gonzales, E.A. Prieto, G. Catindig, J.D. Vasquez, H.A. Husay, M.A. Tumanguil-Quitoras, J. Muldera, H. Kitahara, A. Somintac, A. Salvador, E. Estacio, & M. Tani, "Photoconductivity, carrier lifetime and mobility evaluation of GaAs films on Si (100) using optical pump terahertz probe measurements", Semiconductor Science and Technology, 34 (3), 035031. <https://doi.org/10.1088/1361-6641/ab0626>.
 - 9.) H. Liu, Y. Chu, Y. Liu, T. Hayasaka, L.P. Lopez, V.C. Copa, X. Wang, Z. You, & L. Lin, "A Quasi-Static Electrical Measurement Scheme for Probing Gas Reactions on Graphene Surface" in 32nd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2019), Seoul, South Korea; 27 January 27 - 31 January 2019. <https://doi.org/10.1109/MEMSYS.2019.8870665>.
 - 10.) C.A.M. Dingle, J.F.M. Jecong, F.C. Hila, M.E.S.V Ramo, N.R.D. Guillermo, M.R. Vasquez Jr, and V.A.I Samson, "Determination of the REE content, geological age, and absorbed alpha dose of allanite mineral from Palawan, Philippines," X-Ray Spectrometry, 48 (5), 513-521 (2019). <https://doi.org/10.1002/xrs.3029>.

2. Paper published in local journal (14)

3. International conference presentations (WITHOUT full paper, 14)

- 1.) J. Afalla, A. De Los Reyes, M.A. Faustino, G. Catindig, E.A. Prieto, K.C. Gonzales, V. Mag-Usara, A. Somintac, A. Salvador, E. Estacio, & M. Tani, "Photoconductivity in

- LT-GaAs-on-Si studied by optical pump terahertz probe,” in JSAP-OSA Joint Symposia, Hokkaido University, Sapporo Campus, Hokkaido, Japan, September 18 – 21, 2019.
- 2.) V. Copa, L. Lopez, Jr., T. Hayasaja, H. Liu, Y. Liu, E. Estacio, A. Somintac, A. Salvador, and L. Lin, “Dependence of graphene-based chemiresistive sensor response and recovery on gas flow rates,” in 5th International Conference on Applied System Innovation (IEEE ICASI 2019), April 11-15, 2019, Fukuoka, Japan.
 - 3.) L. Lopez, Jr., , “Dependence of graphene-based chemiresistive sensor response and recovery on gas flow rates,” in 5th International Conference on Applied System Innovation (IEEE ICASI 2019), April 11-15, 2019, Fukuoka, Japan.
 - 4.) E.A. Prieto, K.C. Gonzales, A. De Los Reyes, A. Somintac, A. Salvador, & E. Estacio, “Terahertz emission enhancement in GaAs on Si(100) in reflection and transmission excitation geometries” in 6th International Conference on Applied and Engineering Physics (ICAEP), October 22-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
 - 5.) E.A. Prieto, K.C. Gonzales, A. De Los Reyes, A. Somintac, A. Salvador, & E. Estacio, “Terahertz emission enhancement in GaAs on Si(100) in reflection and transmission excitation geometries” in 6th International Conference on Applied and Engineering Physics (ICAEP), October 22-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
 - 6.) M.J. Empizo, K. Yamanoi, T. Shimizu, N. Sarukura, B. Singidas, R. Sarmago, A. Salvador, & T. Fukuda, “Effects of deuterium-ion plasma irradiation on the optical properties of bulk zinc oxide single crystals,” in 6th International Conference on Applied and Engineering Physics (ICAEP), October 22-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
 - 7.) M.H. Balgos, E.A. Prieto, R. Jaculbia, M. Tani, E. Estacio, A. Salvador, A. Somintac, N. Hayazawa, & Y. Kim, “Locating the n⁺-GaAs/KLT-GaAs interface using a cross-sectional scanning tunneling microscope,” in 6th International Conference on Applied and Engineering Physics (ICAEP), October 22-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
 - 8.) E. Estacio, N. Cabello, A. De Los Reyes, J. Lopez, V. Sarmiento, J.P. Ferrolino, M.A. Faustino, V.D.C. Vistro, C. Yu, H. Bardolaza, M. Talara, M. Shiihara, V. Mag-Usara, J. Afalla, H. Kitahara, M. Tani, A. Salvador, & A. Somintac, “Enhanced THz emission of ilicon nanowire-coated gallium arsenide photoconductive antenna,” in 6th Academic Conference on Natural Science for Young Scientists, Master & PhD Students (CASEAN6), October 23-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
 - 9.) A.F. Montecillo, G.A. Catindig, H.A. Husay, J.D. Vasquez, M.A. Faustino, A. De Los Reyes, A. Salvador, E. Estacio, & A. Somintac, “Terahertz emission in epitaxially lifted i-GaAs/n-GaAs thin films on silicon substrates in the transmission excitation geometry,” in 6th Academic Conference on Natural Science for Young Scientists, Master & PhD Students (CASEAN6), October 23-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
 - 10.) M.J. Empizo, M.A. Zosa, E. Solibet, V. Agulto, Y. Minami, K. Yamanoi, T. Shimizu, A.A. Padama, V.A. Samson, R.V. Sarmago, A. Salvador, & N. Sarukura, “Grazing x-ray diffraction measurements of hydrogen-ion and deuterium-ion plasma-irradiated

bulk zinc oxide single crystals,” in 6th Academic Conference on Natural Science for Young Scientists, Master & PhD Students (CASEAN6), October 23-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.

- 11.) M.A. Tumanguil, K.C. Gonzales, E.A. Prieto, A. De Los Reyes, G.A. Catindig, A. Somintac, E. Estacio, & A. Salvador, “Effect of the growth temperature on the terahertz emission of GaAs on silicon,” in 6th Academic Conference on Natural Science for Young Scientists, Master & PhD Students (CASEAN6), October 23-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
- 12.) P.M. Tingzon, N.I. Cabello, H.A. Husay, J.J. Esilit, K. Cook, J. Kapraun, A. Somintac, A. Salvador, C. Chang-Hasnain, & E. Estacio, “Compressive and tensile stress study of the MEMS used on a 1060 nm tunable VCSEL,” in 6th Academic Conference on Natural Science for Young Scientists, Master & PhD Students (CASEAN6), October 23-26, 2019, Thai Nguyen University, Thai Nguyen City, Vietnam.
- 13.) V.A.I. Samson, K.A. Salazar, V.C. Agulto, M.J. Empizo, T. Shimizu, K. Yamanoi, K. Shinohara, P. Kidkhuntod, S. Sattayaporn, N. Sarukura, & R.V. Sarmago, “Structural analysis of Fe-doped ZnO using X-ray absorption spectroscopy,” in Asian Conference on X-ray Spectroscopy (ACXAS 2019), August 28-30, 2019, Holiday Inn Chiang Mai Hotel, Chiang Mai, Thailand.
- 14.) K.A. Salazar, V. Agulto, M.j. Empizo, T. Shimizu, K. Yamanoi, K. Shinohara, P. Kidkhuntod, S. Sattayaporn, V.A. Samson, N. Sarukura, & R.V. Sarmago, “Fast UV emission lifetime from hydrothermally grown ZnO:Fe microrods,” in 2019 Filipino Scholars Symposium, Osaka University, Japan, July 7-8, 2019.

4. Local conference papers (With full paper in print proceedings, 43)

- 1.) A.E. De Los Reyes, J.D.E. Vasquez, L.P. Lopez, Jr., H.R. Bardolaza, C. Chang, A.S. Somintac, A.A. Salvador, & E. Estacio, “Temperature-dependent terahertz time-domain spectroscopy of MBE-grown single- and multi-layered InAs/GaAs quantum dots,” in Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 2.) R. Simon, N.A.F. Zambale, M.I. Carillo, A. Somintac, A. Salvador, E. Estacio & N. Hermosa, “Reflectivity of textured GaAs modelled as graded index film,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 3.) E.J.C.D. Solibet, M.J.F. Empizo, M.C.M. Angub, R.C. Veloz, C.J.T. Vergara, H.A.F. Husay, K. Yamanoi, T. Shimizu, A.A. Salvador, N. Sarukura, & A.S. Somintac, “Structural properties of hydrothermal-grown ZnO nanostructures fabricated using different ZnAc concentrations,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 4.) N.I. Cabello, A. De Los Reyes, J. Lopez, V. Sarmiento, J.D. Vasquez, H. Bardolaza, G.A. Catindig, K.G. Gonzales, K.L. Patrocenio, R. Jagus, E.A. Prieto, A. Salvador, A. Somintac, & E. Estacio, “Terahertz emission enhancement of gallium arsenide coated with silicon nanowires,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 5.) I.C. Verona, A. De Los Reyes, L. Lopez, H. Bardolaza, M.A. Faustino, A. Somintac, A. Salvador, & E. Estacio, “Determination of pulse width and estimation of pulse-

- to-pulse jitter of femtosecond fiber laser pulses using optical autocorrelation and cross correlation techniques,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 6.) G.A. Catindig, A.E. De Los Reyes, J.D. Vasquez, H. Bardolaza, K.L. Patrocenio, R. Jagus, A. Somintac, E. Estacio, & A. Salvador, “Thermal-induced tensile and compressive strain effects on the THz emission from epitaxially lifted-off undoped/n-type GaAs,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 7.) M. Valenzona, L.V. Sayson, & A. Somintac, “Supercapacitive performance of hydrothermally grown ZnO on activated Carbon fiber cloth,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 8.) P.M. Tingzon, N.I. Cabello, H.A. Husay, J.J. Eslit, J. Kapraun, A. Somintac, A. Salvador, C. Chang-Hasnain, & E. Estacio, “Stress analysis of a four-legs actuator type MEMS on a 1060 nm HCG-MEMS Tunable VCSEL,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 9.) J.N. Pangasinan, & A. Somintac, “Spray pyrolysis deposition of Tin Oxide for supercapacitor electrode application,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 10.) G. Maylem, L.V. Sayson, H.A. Husay, A. Salvador, E. Estacio, & A. Somintac, “Enhanced supercapacitor performance of Cu_xO deposited on activated carbon cloth,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 11.) H. Bardolaza, M.A. Faustino, A. De Los Reyes, V.D. Vistro, N.I. Cabello, I.C. Verona, J.P. Ferrolino, G.A. Catindig, K.C. Gonzales, K.L. Patrocenio, R. Jagus, E.A. Prieto, D.A. Lumantas, J.D. Vasquez, J. Afalla, J. Muldera, V.K. Mag-usara, A. Salvador, A. Somintac, & E. Estacio, “Development of a photoconductive antenna based on a modulation-doped GaAs/AlGaAs heterostructures,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 12.) M. Manrique, H.A. Husay, A. Salvador, E. Estacio, & A. Somintac, “Thermal effects in the Raman scattering of vertically aligned silicon nanowire arrays as investigated by fluence-dependent measurements,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 13.) P.B. Javar, G.P. Maylem, L.V. Sayson, & A.S. Somintac, “Activated carbon cloth-based electrode for supercapacitor applications,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 14.) A.S. Escolano, E.J.D. Solibet, E. Estacio, A. Salvador, & A. Somintac, “Calculation of the pyroelectric coefficient and the Debye radius of SnO₂-Fe₂O₃ pyroelectric composite deposited via spray pyrolysis,”
 - 15.) A.J. Ledesma, A. Montecillo, G.A. Catindig, H.A. Husay, J.D. Vasquez, A. Salvador, E. Estacio, & A. Somintac, “Optical characterization of epitaxially lifted-

- off gallium arsenide thin film on acetate,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 16.) V.D.A. Vistro, A. De Los Reyes, M.A. Faustino, H. Bardolaza, J.P. Ferrolino, A. Somintac, A. Salvador, & E. Estacio, “Effects of various laser focusing conditions on the efficiency of photoconductive antenna arrays,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 17.) M.R.R. Ramos, H.A. Husay, E. Estacio, J. Ibus-Armonia, D. Buenafe, N. de Guzman, M.D. Balela, A. Salvador, & A. Somintac, “Quantification of suppressed fluorescence in the Raman scattering of Rhodamine B deposited in Ag NW SERS substrates,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 18.) A. Ahmad, J. Lopez, A. De Los Reyes, P.M. Tingzon, A. Salvador, A. Somintac, & E. Estacion “Terahertz emission from heavily-doped p-type silicon hole arrays,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 19.) J.D. Vasquez, A. De Los Reyes, M.A. Faustino, I.C. Verona, H. Bardolaza, A. Somintac, A. Salvador, & E. Estacio, “Development of a terahertz time-domain spectroscopy setup based on a 1550 nm femtosecond fiber laser,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 20.) H. Kitahara, E. Estacio, K. Tominaga, & M. Tani, “Broadband wave plates in the terahertz region,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 21.) B.G. Singidas, J.D. Vasquez, V.A.I. Samson, A. Salvador, E. Estacio, & R. Sarmago, “Effect of graphene on the photorefectance and photoluminescence of GaAs,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 22.) M.L. Talara, V.K. Mag-Usara, Y. Oda, H. Kitahara, J.P. Afalla, G. Torosyan, L. Scheuer, R. Beigang, E.T. Papaioannou, E. Estacio, C. Que, A.K. Tapia, K. Tominaga, & M. Tani, “Efficient THz generation of Fe/Pt spintronic heterostructure using 400-nm and 800-nm pump wavelengths,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 23.) M.J.F. Empizo, M.A.H. Zosa, E.J.C.D.G. Solibet, V.C. Agulto, Y. Minami, K. Yamamoto, T. Shimizu, A.A.B. Padama, V.A.I Samson, R.V. Sarmago, A.A. Salvador, & N. Sarukura, “ di incidence x-ray diffraction measurements of a deuterium-ion plasma-irradiated bulk zinc oxide single crystal,” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
 - 24.) K.A. Salazar, V.C. Agulto, M.J. Empizo, T. Shimizu, K. Yamanoi, K. Shinohara, P. Kidkhunthod, S. Sattayaporn, V.A. Samson, N. Sarukura, & R.V. Sarmago “Fe³⁺-doping on ZnO microstructures via hydrothermal route” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.

- 25.) J.C. Taguba, B.G. Singidas, V.A. Samson, & R.V. Sarmago “Surface roughness analysis of strontium-doped lanthanum cobaltite thin films prepared via chemical solution deposition” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 26.) K.Y. Levares, J.C. Taguba, V.A. Samson, & R.V. Sarmago “Strontium-doped lanthanum manganite films prepared via chemical solution deposition” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 27.) J.J. Miranda, J. De Mesa, Y. Gaffud, A. Rillera, & R.V. Sarmago “Transmission spectroscopy of CeO₂ thin film deposited on glass via femtosecond pulsed laser deposition” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 28.) M.M. Rosete, M.A. Zosa, R.V. Sarmago, & W. Garcia “Electrostatic stability of Br₂Si₂CaCu₂O₈ in ethanol with common salt as a supportive electrolyte” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 29.) M.B. Celebrado, K.A. Salazar, M.A. Judicpa, R. Lopez, A.C. Yago, V.A. Samson, & R.V. Sarmago “Synthesis and characterization of ZnO microrods with polyaniline prepared by hydrothermal method” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 30.) X.A. Galapia, V.A. Samson, & Sarmago, Roland “Two -step sintering approach for the ex-situ heat treatment of polycrystalline” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 31.) B.J. Magallanes, K.A. Salazar, M.A. Judicpa, R. Lopez, V.A. Agulto, M.J. Empizo, K. Shinohara, K. Yamanoi, T. Shimizu, A.C. Yago, V.A. Samson, R.V. Sarmago, & N. Sarukura “Polyvinylpyrrolidone-assisted ZnO growth via hydrothermal method” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 32.) A.P. Rillera, Y.K. Ong, V.A. Samson, & R.V. Sarmago, “Densification behavior of cerium oxide grains in suspension-derived deposits” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 33.) C.L. Llemit, V.A. Samson, & R.V. Sarmago “Synthesis of SrIn₂O₄ by solid state reaction” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 34.) M.A. Uy, J.G. Torremoro, V.A. Samson, & R.V. Sarmago “YBCO films on buffered Haynes[®] 230 substrate” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 35.) K.N. Mamucud, K.A. Salazar, V.C. Agulto, M.J. Empizo, K. Shinohara, K. Yamanoi, T. Shimizu, N. Sarukura, V.A. Samson, & R.v. Sarmago “Effect of Iodine addition on the structural and optical properties of ZnO microrods grown via Hydrothermal method” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 36.) F.I. De Vera, J.L. Tacneng, V.A. Samson, C.A., Arcilla, & R.V. Sarmago “Reduced activation energies of bulk Bi₂Sr_{2-x}In_xCaCu₂O_{8+δ}” Proceedings of the

Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.

- 37.) J.A. De Mesa, J.J. Miranda, A.R. Rillera, R.V. Sarmago, & W. Garcia “Surface morphology and elemental composition of CeO₂ thin films grown by femtosecond pulsed laser deposition” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 38.) A. Guingab, J. Tacneng, V.A. Samson, & R.V. Sarmago “Synthesis of Bi₂Te₃ phase via PbO addition to the BSCCO(2234) system” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 39.) M.B. Nalayag, M.A. Judicpa, R. Lopez, K.A. Salazar, A.C. Yago, V.A. Samson, & R.V. Sarmago “Synthesis and characterization of Zinc Oxide-Poly(allylamine) Hydrochloride (PAH) composites prepared via hydrothermal method” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 40.) J.M. Inguito, K.A. Salazar, M.A. Judicpa, R. Lopez, V. C. Agulto, M.J. Empizo, K. Yamanoi, K. Shinohara, T. Shimizu, N. Sarukura, A.C. Yago, V.A. Samson, & R.V. Sarmago “Influence of Poly(diallyldimethylammonium chloride) on the morphology, crystalline structure, and photoluminescence of ZnO microrods grown via *in-situ* hydrothermal route” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019.
- 41.) C.V. Cantor, V.A. Samson, & R.V. Sarmago “Magnesium Chloride as flux and binder in the sedimentation deposition of YBa₂Cu₃O_{7-δ} films” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019
- 42.) C.A. Dingle, R. Diwa, F. Hila, T. Chubkhuntod, P. Kidkhuntod, & V.A. Samson “Fe K-edge X-ray absorption near-edge structure spectroscopy of Allanite from Palawan, Philippines” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019
- 43.) G. Reyes, K.A. Salazar, M.A. Uy, M.A. Judicpa, R. Lopez, A.C. Yago, V.A. Samson, & R.V. Sarmago “Citrate seed-assisted growth of ZnO microrods” Proceedings of the Samahang Pisika ng Pilipinas, Bohol Tropics Resort, Tagbilaran City, Bohol, 29 May – 01 June 2019

5. Local conference papers (Without full paper in print proceedings, 8)

- 1.) E. Estacio, “Current semiconductor materials and optoelectronic device research at the Condensed Matter Physics Laboratory,” Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.
- 2.) A. Momtecillo, G.A. Catindig, J.D. Vasquez, D. Lumantas, H. Husay, A. De Los Reyes, M.A. Faustino, A. Salvador, E. Estacio, & A. Somintac, “Terahertz emission of epitaxially lifted i-GaAs/n-GaAs films on silicon substrates in the transmission excitation geometry.” Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.

- 3.) A. Salvador, E. Estacio, A. Somintac, M. Tani, J. Afalla, A. De Los Reyes, H. Bardolaza, M.A. Faustino, J.P. Ferrolino, N.I. Cabello, V.DC Vistro, I.C. Verona, G.A. Catindig, K.C. Gonzales, K.L. Patrocenio, R. Jagus, E.A. Prieto, D.A. Lumantas, J.D. Vasquez, J. Muldera, V.K. Mag-usara, "Development of THz photoconductive antennas based on GaAs/AlGaAs modulation-doped heterostructures," Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.
- 4.) M. Tani, K. Yamamoto, M.C.S. Escano. T. Furuya, H. Kitahara, V. Mag-Usara, J. Afalla, K. Mizuno, M. Talara, M. Shiihara, A. Esaki, Y. Ono, H. Otsuka, H. Sanada, H. Okazaki, T. Nakagawa, C. Tachioka, H. Takeuchi, Y. Mori, J. Muldera, & E. Estacio, "Research Activities of terahertz science research group in Research Center for Development of Far-Infrared Region, University of Fukui," Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.
- 5.) A. Esaki, Y. Ono, H. Otsuka, H. Sanada, A.K. Ahmad, J.P. Ferrolino, I. Vernona, A. De Los Reyes, H. Rillera-Bardolaza, J. Afalla, V. Mag-Usara, E. Estacio, M. Tani, "Terahertz photoconductive antenna fabrication at the National Institute of Physics," Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.
- 6.) J. Afalla, G. Catindig, A. De Los Reyes, E. Prieto, M.A. Faustino, V.D. Vistro, K.C. Gonzales, H. Bardolaza, V.K. Mag-Usara, H.A. Husay, J. Muldera, N.I. Cabello, J.P. Ferrolino, H. Kitahara, A. Somintac, A. Salvador, M. Tani, & E. Estacop, "LT-GaAs on Silicon photoconductive antenna prototypes: layer and device performance evaluation," Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.
- 7.) V.K. Mag-Usara, G. Torosyan, C. Petoukhoff, M. Talara, C. Tachioka, J. Afalla, J. Muldera, M.C.S. Escano, J.P. Ferrolino, A. De Los Reyes, E. Estacio, A. Somintac, A. Salvador, M. Nakajima, K. Dani, M. Rahm, E. Th. Papaioannou, R. Beigang, & M. Tani, "Terahertz emission from metallic spintronics bilayers," Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.
- 8.) Cyril Sadia-Galang, "MBE growth of a strong THz wave surface emitter based on p-doped InAs on n-doped GaSb," Philippine-Japan Conference on Photonics and Optical Materials, National Institute of Physics, UP Diliman, Quezon City, 12-14 December, 2019.

6. NIP funded projects (5)

Project Leader	Title	Period
Elmer Estacio, Ph.D.	Terahertz emission enhancement from SI-GaAs with silicon nanostructures	Jan 1, 2019 - Dec 31, 2019

Arnel Salvador, Ph.D.	Terahertz Properties of Epitaxially Lifted Off Gallium Arsenide Thin Films	Jan 1, 2019 - Dec 31, 2019
Armando Somintac, Ph.D.	Electrochemical characterization of metal oxide-based electrode for supercapacitors	Jan 1, 2019 - Dec 31, 2019
Roland V. Sarmago, Ph.D.	Doping ZnO Rods with Transition Metals Cu and Fe	Jan 1, 2019 - Dec 31, 2019
Samson, Vallerie Ann	Synchrotron X-ray Analyses of Advanced Materials and Minerals	Jan 1, 2019 - Dec 31, 2019

8. Major equipment acquired/ upgraded (15)

Equipment & Description	Cost (PHP)	Mode of Acquisition	Project Leader
1.) Data Processing and Storage Unit	₱ 79,900.00	PCARI IIID-2016-010 Chemical and Environment - Portable Sensor Technologies	Arnel A. Salvador, PhD
2.) Two Channel Function Generator *Function generator, current source, voltage source, multimeter, lock-in amplifier, temperature controller	₱ 1,519,355.12		
3.) Surge protector and auto voltage separator	₱ 211,350.00		
4.) Thermal Deposition Facility	₱ 10,418,183.00		
5.) Fume Hoods/Gas	₱ 494,775.00		

Mixing Chamber Box			
6.) Microliter Pump	₱ 29,950.00		
7.) Thermal Deposition Facility	₱ 9,999,999.00	PCARI IIID-2015-013 3 rd -Generation VCSEL for Resilient Communication Networks (3V-ReCoN)	Elmer S. Estacio, PhD
8.) Inductively coupled plasma reactive ion etcher	₱ 14,000,000.00		
9.) Mask Aligner	₱ 5,912,673.00		
10.) LuxX CW diode laser	₱ 681,458.00		
11.) Andor Shamrock 303i Triple Grating Spectrometer with iDus 401 CCD Detector	₱ 2,200,000.00	PCIEERD 03544 "Development of a Raman Microscopy and Spectroscopy (RMS) Setup"	Armando S. Somintac, PhD
12.) Sacher Lion 785 nm Laser System	₱ 658,000.00		
13.) Spin Coater and accessories	₱ 300,000.00	NIP	Roland V. Sarmago
14.) Spectrometer	₱ 7,499,000.00	Office of the Chancellor	Roland V. Sarmago
15.) Stirring hotplate	₱ 40,000.00	NIP	Roland V. Sarmago
Total	₱ 48,131,970.12		

9. Research travels abroad by NIP faculty & student researchers (x)

NIP Personnel	Purpose	Place	Dates	Mode of Exchange
Maria Herminia Balgos	International Program Associate	RIKEN, Wako, Saitama Japan	October 2018 - July 2019	MOA
Maria Angela Faustino	Collaboration research for the	University of Fukui, Fukui, Japan	February 12-20, 2019	

		Bilateral Joint Project supported by Japan Society for the Promotion of Science (JSPS) and DOST			
Victor DC Vistro		Collaboration research for the Bilateral Joint Project supported by Japan Society for the Promotion of Science (JSPS) and DOST	University of Fukui, Fukui, Japan	February 12-20, 2019	
Hanna Bardolaza		Collaboration research for the Bilateral Joint Project supported by Japan Society for the Promotion of Science (JSPS) and DOST	University of Fukui, Fukui, Japan	February 12-20, 2019	
Elmer S. Estacio		7th International Workshop on Far-Infrared Technologies (7th IW-FIRT)	University of Fukui, Fukui, Japan	March 04-09, 2019	
Alexander De Los Reyes		7th International Workshop on Far-Infrared Technologies (7th IW-FIRT)	University of Fukui, Fukui, Japan	March 04-09, 2019	
Neil Irvin Cabello		7th International Workshop on Far-Infrared Technologies (7th IW-FIRT)	University of Fukui, Fukui, Japan	March 04-09, 2019	
Jamela Pangasinan	Visiting Student Researchers		Mechanical Engineering Department University of California Berkeley, USA	April 15-Aug 15, 2019	MOA

Rogie Madula	Visiting Student Researchers	Mechanical Engineering Department University of California Berkeley, USA	April 15- Aug 15, 2019	MOA
Arnel Salvador A.	Research Visit	CERN, Switzerland	June 3-5, 2019	
Vallerie Samson Ann	Research Visit	CERN, Switzerland	June 3-5, 2019	
Rogie Madula	Sensors Expo and Conference 2019	McEnery Convention Hall, San Jose California, USA	June 25-27, 2019	
Elmer Estacio	Research Visit	University of Fukui, Fukui, Japan	June 03 – July 31, 2019	MOA
Elmer Estacio	2nd Japan-Philippines Terahertz Workshop (JPTW 2019)	University of Fukui, Fukui, Japan	June 14-18, 2019	
Neil Cabello Irvin	2nd Japan-Philippines Terahertz Workshop (JPTW 2019)	University of Fukui, Fukui, Japan	June 14-18, 2019	
Maria Faustino Angela	2nd Japan-Philippines Terahertz Workshop (JPTW 2019)	University of Fukui, Fukui, Japan	June 14-18, 2019	
Victor DC Vistro	2nd Japan-Philippines Terahertz Workshop (JPTW 2019)	University of Fukui, Fukui, Japan	June 14-18, 2019	
Anthony Francis Montecillo	2nd Japan-Philippines Terahertz Workshop (JPTW 2019)	University of Fukui, Fukui, Japan	June 14-18, 2019	

Bess Singidas	To conduct experiment in Synchrotron Light Research Institute and attend the ASEAN Workshop on Photoemission Electron Spectroscopy and Microscopy	Synchrotron Light Research Institute	June 16-27 2019	UP COOPER ATE Grant
Jerome Taguba	To conduct experiment in Synchrotron Light Research Institute and attend the ASEAN Workshop on Photoemission Electron Spectroscopy and Microscopy	Synchrotron Light Research Institute	June 16-27 2019	UP COOPER ATE Grant
Marvin Nalayog	Visiting Student Researcher	Suranaree University of Technology (SUT), Thailand	June 24-26 2019	UP COOPER ATE Grant
Michelle Celebrado	Visiting Student Researcher	Suranaree University of Technology (SUT), Thailand	June 24-26 2019	UP COOPER ATE Grant
Jonah Inguito	Visiting Student Researcher	Suranaree University of Technology (SUT), Thailand	June 24-26 2019	UP COOPER ATE Grant
Kloudene Salazar	2019 Filipino Scholars Symposium	Osaka University ILE	June 30 – July 20, 2019	
Mayrene Uy	2019 Filipino Scholars Symposium	Osaka University ILE	June 30 – July 20, 2019	
Roland V. Sarmago	2019 Filipino Scholars Symposium	Osaka University ILE	June 30 – July 20, 2019	
Elmer S. Estacio	2019 Filipino Scholars Symposium	Osaka University, Japan	July 7-8, 2019	

Alexander De Los Reyes	Filipino	2019 Scholars Symposium	Osaka University, Japan	July 7-8, 2019	
Arnel Salvador	A.	2019 Photon Beam Symposium	Tokyo Technology Campus Innovation Center, Tokyo	July 11, 2019	
Jerome Taguba		Meeting for Synchrotron Proposal at Aichi Synchrotron Radiation Center	Aichi (Nagoya), Japan	October 6-13, 2019	Osaka University International Joint Research Program
Vallerie Samson	Ann	Meeting for Synchrotron Proposal at Aichi Synchrotron Radiation Center	Aichi (Nagoya), Japan	October 6-13, 2019	Osaka University International Joint Research Program
Elmer Estacio		Training Workshop on Terahertz (THz) Spectroscopic Techniques	University of Fukui, Fukui, Japan	November 09-11, 2019	
Neil Cabello	Irvin	Training Workshop on Terahertz (THz) Spectroscopic Techniques	University of Fukui, Fukui, Japan	November 09-11, 2019	
Elmer S. Estacio		International Conference on Science and Its Application for Sustainable Development Goals 2019	Kendari, Indonesia	November 16-17, 2019	
Arnel Salvador		International Conference on Radiation Emission and Materials	Mahidol University, Bangkok, Thailand	December 15-18, 2019	

10. Visiting researchers (12)

Visitor, affiliation and email address	Purpose/Duration of visit	NIP Personnel Contact Person	Mode of Exchange
Masahiko Tani, tani@fir.u-fukui.ac.jp	December 8 20-21, 2018	Elmer S. Estacio	MOA between Fukui University and National Institute of Physics
Masaki Shiihara, shiihara@fir.u-fukui.ac.jp	November 18 - December 31, 2019		
Valynn Katrine Magusara, valynn@fir.u-fukui.ac.jp	Affiliation: Research Center for Development of Far-Infrared Region, University of Fukui (FIR-FU)		
Jessica Afalla, jessica@fir.u-fukui.ac.jp			
Yoshiyasu Ono			
Hiroshi Otsuka			
Akihiro Esaki			
Hiroki Asada			
Melvin John Empizo	March 17-20, 2019 ILE-NIP Joint Research Workshop May 19 – June 2019 Samahang Pisika ng Pilipinas 37 th Conferece	Roland V. Sarmago	
Verdad Agulto	March 17-20, 2019 ILE-NIP Joint Research Workshop May 19 – June 2019 Samahang Pisika ng Pilipinas 37 th Conferece	Roland V. Sarmago	
Keito Shinohara	March 17-20, 2019 ILE-NIP Joint Research Workshop May 19 – June 2019 Samahang Pisika ng Pilipinas 37 th Conferece	Roland V. Sarmago	

Yohei Koike	May 19 – June 2019 Samahang Pisika ng Pilipinas 37 th Conferece	Roland V. Sarmago	
11. MOA's entered with local or foreign institutions and other external collaborators (1)			
Institution	Title of Research and Duration	NIP Personnel/ Contact Person	
F. Extension Work Highlights			
Research Interns/ OJT's (Non-NIP), for trainings held at NIP (16)			
<p>High school students from Philippine Science High School; under Summer Immersion Program; Duration: June 14 to July 26, 2018; NIP contact person: Arnel A. Salvador, PhD <i>Alexander Carlo Castro (Philippine Science High School, Central Luzon Campus)</i> <i>Joanne Micaela Dizon (Philippine Science High School, Cagayan Valley Campus)</i> <i>Dianne Rosal (Philippine Science High School, CALABARZON Campus)</i> <i>Hayes Agustin (Philippine Science High School, Cagayan Valley Campus)</i> <i>Adi Vega (Philippine Science High School, Cagayan Valley Campus)</i> <i>Carlos Miguel Pineda (Philippine Science High School, Cagayan Valley Campus)</i></p>			
<p>High school students from Philippine Science High School; under Summer Immersion Program; Duration: June 14 to July 26, 2018; NIP contact person: Roland V. Sarmago, PhD <i>Enoch Bryce Pandan (Philippine Science High School, Central Mindanao Campus)</i> <i>Aero John Cerezo (Philippine Science High School, CALABARZON Campus)</i> <i>Victor Orlando Ocampo II (Philippine Science High School, Cagayan Valley Campus)</i> <i>Riana Gabrielle Gamboa (Philippine Science High School, Mindanao Campus)</i> <i>Franco Tanicala (Philippine Science High School, SOCCSKSARGEN Region Campus)</i></p>			

Adrian Justin Lintag (Philippine Science High School, Central Luzon Campus)
Gabriel Dax Agura (Philippine Science High School, Western Visayas Campus)
Eirene Gomez (Philippine Science High School, Eastern Visayas Campus)
Lake Therese Gonzaga (Philippine Science High School, Central Luzon Campus)
Israel John Peñalosa (Philippine Science High School, Central Luzon Campus)

D. Main Challenges and Proposed Solutions

Main Challenges Encounter	Proposed Solutions
<p>Supplies – Order of supplies were withheld due to non-payment of previous orders. These resulted to the delay in the experiment and thesis of the student.</p>	<p>It is recommended to properly track documents related to purchase and payment. It is also necessary to properly have an inventory of remaining chemicals and supplies.</p>
<p>Equipment – either equipment downtime or purchase delay resulted to students not graduating on time. These resulted to graduate students leaving the group and seeking employment due to financial constraints.</p>	<p>It is proposed to fast-track the purchase of equipment to avoid delay for both project and/or thesis-related deliverables. Steps for the proper maintenance and upkeep of the equipment should also be taken into consideration.</p>

E. Positions of Responsibility Held

National (2)

Name of NIP Personnel	National Award or Accreditation, Positions of Responsibility Held	Award-giving body/ Organization
Elmer S. Estacio, Ph. D.	Coordinator, Material Science and Engineering Program	UP College of Science
	Treasurer	Samahang Pisika ng Pilipinas
	Achievement Award in Physics	National Research Council of the Philippines
Armando S. Somintac, Ph.D.	Director, Project Management and	UP Office of the Vice Chancellor for Research and Development

III. Photos, ISI/SCI publications

Photos



Figure 1. Dissertation defense of Hanna Rillera-Bardolaza held last March 20, 2019.



Figure 2. Members of CMPL Superconductor group during Summer Workshop April 15-17 2019.



Figure 3. CMPL Superconductor group members attending the SPP Conference in Bohol, May 29 – June 2, 2019.



Figure 4. Dr. Vallerie Ann Samson at CERN, Switzerland, June 4, 2019.



Figure 5. Professors and students 2019 Filipino Scholars Symposium held in Osaka University, July 2019.



Figure 6. CMPL members at Synchrotron Light Research Institute, Thailand, June 2019.

ISI/SCI Publications:

- 1.) M.H. Balgos, E.A. Prieto, M. Tani, E. Estacio, A. Salvador, A. Somintac, N. Hayazawa, & Y. Kim, Atomically-resolved interface imaging and terahertz emission mechanism of gallium arsenide epilayers. *Journal of Applied Physics*, 126 (23), 235706, (2019). <https://doi.org/10.1063/1.5118815>.
- 2.) V.C. Agulto, M.J.F. Empizo, K. Kawano, K.A. Salazar, Y. Minami, K. Yamanoi, T. Shimizu, A.C.C. Yago, R.V. Sarmago, & N. Sarukura, "Combination of post-growth treatments and their effects on ZnO microrods as potential UV Phospors," *Optical Materials*, Vol. 86, pp. 12-17. <https://doi.org/10.1016/j.optmat.2018.09.018>.
- 3.) J. Afalla, A. De Los Reyes, A. Faustino, V.D.C. Vistro, H.R. Bardolaza, G.A. Catindig, K.C. Gonzales, E.A. Prieto, J. Muldera, V.K. Mag-Usara, N.I. Cabello, V.C. Copa, J.P. Ferrolino, G. Torosyan, T. Furuya, H. Kitahara, A. Somintac, A. Salvador, M. Tani, & E. Estacio, "Detection performance of LT-GaAs-on-Silicon bowtie photoconductive antenna prototype," in *Proceedings of the 44th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz 2019)*, Maison de la Chimie Paris; France, September 1-6 2019, Category number CFP19IMM-ART; Code 153046. <https://doi.org/10.1109/IRMMW-THz.2019.8874195>.
- 4.) F.I. de Vera, H.R. Bardolaza, C. Arcilla, & R. Sarmago, "Effect of In₂O₃ on the grain connectivity and superconducting behavior of Bi₂Sr_{2-x}In_xCaCu₂O_{8+d}," *Springer Nature Applied Science* (2019) 1:96. <https://doi.org/10.1007/s42452-018-0109-5>.
- 5.) N.I. Cabello, P.M. Tingzon, H.A. Husay, J.D. Vasquez, R. Jagus, K.I. Patrocenio, K.C. Gonzales, G.A. Catindig, E.A. Prieto, A. Somintac, A. Salvador, & E. Estacio, "Growth and fabrication of 850 nm AlGaAs/GaAs vertical cavity surface emitting laser structure," in *Proceedings of the 8th International Seminar on New Paradigm and Innovation on Natural Sciences and Its Application (ISNPINSA 2018)*, Semarang, Central Java;

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- 6.) H. Bardolaza, J. Afalla, A. De Los Reyes, D.A. Lumantas, J.D. Vasquez, J. Muldera, V.K. Mag-Usara, A. Somintac, A. Salvador, M. Tani, & E. Estacio, "Efficacy of proposed 2DEG-based photoconductive antenna using magnetic bias-controlled carrier transport," *Current Applied Physics*, 19 (6), 756-761 (2019). <https://doi.org/10.1016/j.cap.2019.04.003>.
 - 7.) A. Jose, A. Montecillo, A. De Los Reyes, M. Bacaoco, J. Lopez, A. Café, M.A. Faustino, H.A. Husay, J.D. Vasquez, K.C. Gonzales, J.P. Afalla, V.K. Mag-Usara, H. Kiatahara, M. Tani, A. Somintac, A. Salvador, & E. Estacio, "Enhanced terahertz emission of a gallium arsenide thin film on a porous silicon distributed Bragg reflector designed at 800nm wavelength," *Enhanced terahertz emission of a gallium arsenide thin film on a porous silicon distributed Bragg reflector designed at 800nm wavelength*, *Optical Materials*, 92, 335-340 (2019). <https://doi.org/10.1016/j.optmat.2019.04.028>.
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 - 9.) H. Liu, Y. Chu, Y. Liu, T. Hayasaka, L.P. Lopez, V.C. Copa, X. Wang, Z. You, & L. Lin, "A Quasi-Static Electrical Measurement Scheme for Probing Gas Reactions on Graphene Surface" in *32nd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2019)*, Seoul, South Korea; 27 January 27 - 31 January 2019. <https://doi.org/10.1109/MEMSYS.2019.8870665>.
 - 10.) C.A.M. Dingle, J.F.M. Jecong, F.C. Hila, M.E.S.V Ramo, N.R.D. Guillermo, M.R. Vasquez Jr, and V.A.I Samson, "Determination of the REE content, geological age, and absorbed alpha dose of allanite mineral from Palawan, Philippines," *X-Ray Spectrometry*, 48 (5), 513-521 (2019). <https://doi.org/10.1002/xrs.3029>.