

# Research Accomplishments of the Condensed Matter Physics Laboratory, National Institute of Physics

January 1, 2018 - December 31, 2018

**ARNEL A. SALVADOR, Ph. D.**

CMPL Program Coordinator February 27, 2019

<p><b>I. Executive Summary</b></p>																				
<p><b>A. Activities of the Research Group</b></p> <p>Organization</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Professor: <b>4</b></td> <td style="width: 50%;">Apprentices (NIP-Students): <b>2</b></td> </tr> <tr> <td>Asst. Professor: <b>1</b></td> <td>Apprentices (Non-NIP): <b>0</b></td> </tr> <tr> <td>REPS: <b>2</b></td> <td>Undergraduate Members: <b>30</b></td> </tr> <tr> <td>Instructors: <b>5</b></td> <td>Graduate Members: <b>71</b></td> </tr> <tr> <td>Adjunct Researchers: <b>1</b></td> <td></td> </tr> </table> <p>Mentoring</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">BS Physics: <b>1</b></td> <td style="width: 50%;">Number of Graduates: <b>13</b></td> </tr> <tr> <td>BS Applied Physics: <b>7</b></td> <td></td> </tr> <tr> <td>MS Physics: <b>1</b></td> <td></td> </tr> <tr> <td>MS MSE: <b>4</b></td> <td></td> </tr> <tr> <td>PhD Physics: <b>0</b></td> <td></td> </tr> </table>	Professor: <b>4</b>	Apprentices (NIP-Students): <b>2</b>	Asst. Professor: <b>1</b>	Apprentices (Non-NIP): <b>0</b>	REPS: <b>2</b>	Undergraduate Members: <b>30</b>	Instructors: <b>5</b>	Graduate Members: <b>71</b>	Adjunct Researchers: <b>1</b>		BS Physics: <b>1</b>	Number of Graduates: <b>13</b>	BS Applied Physics: <b>7</b>		MS Physics: <b>1</b>		MS MSE: <b>4</b>		PhD Physics: <b>0</b>	
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<p><b>B. Research Highlights</b></p> <p>Papers published/accepted for publications in international peer-reviewed journals: <b>16</b></p> <p>Papers published in local journals: <b>0</b></p> <p>International conference presentations</p> <p style="padding-left: 20px;">Without full paper: <b>20</b></p> <p>Local conference papers</p> <p style="padding-left: 20px;">With full paper: <b>41</b></p> <p style="padding-left: 20px;">Without full paper: <b>4</b></p> <p>NIP funded projects: <b>5</b></p> <p>Non-NIP funded projects: <b>10</b></p> <p>Major equipment acquired/upgraded: <b>15</b></p> <p>Research travels abroad: <b>27</b></p> <p>Visiting researchers: <b>6</b></p> <p>MOA's entered with foreign institutions: <b>1</b></p>																				
<p><b>C. Extension Work Highlights</b></p> <p>Research Interns/ OJT's (Non-NIP), for trainings held at NIP:</p>																				
<p><b>D. Main Challenges Encountered and Proposed Solutions</b></p> <p>Laboratory equipment such as the SEM and XRD need immediate repair and upgrade. We propose to allot budget and find local suppliers for technical support.</p>																				
<p><b>E. Positions of Responsibility Held</b></p> <p>National: <b>4</b></p>																				

## II. Technical Report

### A. Activities of the Research Group

The Condensed Matter Physics Lab (CMPL) has 112 members (faculty, REPS, postdoc, research students) and 2 apprentices. In 2018, fifteen (15) articles were published in ISI journals. Twelve of its research students have successfully defended their dissertation and theses. The NIP, DOSTPCIEERD, OVCRD, OVPA, and PCARI funded ten (10) research projects this year. CMPL sent and received students and researchers to and from the Institute of Laser Engineering, Osaka University, Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand, University of Fukui, Fukui, Japan, Suranaree University of Technology, Nakhon Ratchasima, Thailand, University of Fukui, and RIKEN. Forty-one (41) papers were presented in the 36th Samahang Pisika ng Pilipinas Congress. Twenty (20) works were presented in several international conferences. Faculty and student members participated as organizer and presenter in several workshops and symposia (2nd ICTP Asian Network School and Workshop on Complex Condensed Matter Systems, 7th ASEAN Synchrotron Science Camp, ASEAN Workshop on X-Ray Tomography). Sixty (60) interns and on-the-job trainees from MSUIIT, UPLB, UNP, PSHS System joined the laboratory for short trainings (2-6 weeks)

### 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)  
Deborah Anne Lumantas, M. Sc. (Faculty)  
Harold Co (Faculty)  
Angelo P. Rillera (Faculty)  
Francesca Isabel N. de Vera, M. Sc. (Faculty)  
Jerome C. Taguba (Faculty)  
Hannah R. Bardolaza, M.Sc. (REPS)  
Bess G. Singidas, M. Sc. (REPS)

##### Adjunct Researcher

Elizabeth Ann Prieto, Ph.D.  
(Post Doctoral Researcher)

**Student Member**

Theo Victor A. Cavite (B5)  
Nicole Figueroa (B5)  
Miguel Yee Bacaoco (B5)  
Raisa Mustapha (B5)  
Anselmo Jose C. Ledesma (B5)  
Wilfredo Miguel A Polido III (B5)  
Nikko F. Galarosa (B5)  
Ma. Romina Rogem V. Ramos (B4)  
Angelo Gabriel Nueva (B5)  
Ivan Cedrick M. Verona (B5)  
Ferdinand Cayabyab, Jr. (B5)  
Timothy Vincent Recla (B5)  
Vince Paul P. Juguilon (B5)  
Jairrus Publico (B5)  
Edu James M. Dagumanpan (B5)  
John Jerome G. Mataac (B5)  
Averell Aquino (B5)  
Patricia Javar (B5)  
Mark Christian G. Subaldo (B5)  
Mark Kevin R. Dawisan (B4)  
Ardell Justin B. Vasquez (B4)  
Karen Nicole E. Mamucud (B4)  
Aizanel B. Guingab (B5)  
Kloudene Salazar (B5)  
Giselle S. Reyes (B5)  
Ysabella Kassandra F. Ong (B5)  
Kint Ynnos B. Llevares (B5)  
Christian Loer T. Llemmit (B4)  
Lawrence Jay G. Magsayo (B4)  
Shawntel Joy Leonardo (B5)  
Al Kadeem Ahmad (M2)  
Jeremias Armonia (M2)  
Karl Cedrick Gonzales (M2)  
Jonalds Tacneng (M2)  
Victor DC Andres Vistro (M2)  
Rusty Lopez (M2)  
Jorge Michael Presto (P4)  
Maria Herminia Balgos (P4)  
Gerald Angelo Catindig (P2)  
Horace Andrew Husay (P3)  
Deborah Anne Lumantas (P3)  
Alexander De Los Reyes (P2)  
Erick John Carlo Solibet (P2)  
Kerphy Liandro M. Patrocenio (P2)  
Harold Co (P2)  
Neil Irvin Cabello (P3)  
Jerome Taguba (P3)  
Angelo Rillera (P2)  
Bess Singidas (P3)  
Francesca Isabel de Vera (P3)  
Anthony Montecillo (MSE, M2)

Mae Agatha Tumanguil-Quitoras (MSE, P2)  
Vernalyn Copa (MSE, P2)  
Regine Loberternos MSE, P2)  
Philippe Martin Tingzon (MSE, P2)  
Anthony Tuico (MSE, P2)  
Luce Vida Sayson (MSE, M2)  
Maria Angela B. Faustino (MSE, P3)  
Arven I. Café (P2)  
Rommel J. Jagus (MSE, P2)  
Hannah R. Bardolaza (MSE, P3)  
Maricar Rosete (MSE, P3)  
Efren Suratos (MSE, M2)  
Laureen Ida Ballesteros (MSE, M2)  
John Daniel Vasquez (MSE, M2)  
Clairecynth Yu (MSE, M2)  
Marleane Ferrer (MSE, M2)  
Maria Cecilia Angub (MSE, M2)  
Jamaica N. Pangasinan (MSE, M2)  
Christopher Jude Vergara (MSE, M2)  
Precy Mae Calaque (MSE, M2)  
John Paul R. Ferrolino (MSE, M2)  
Arvin Jay Escolano (MSE, M2)  
Genes P. Maylem (MSE, M2)  
Raymund Veloz (MSE, M2)  
Ron Darell A. Aves (MSE, M2)  
Mylenne Manrique (MSE, M2)  
Archel Escaro (MSE, M1)  
Jamela N. Pangasinan (MSE, M2)  
Michael Rey A. Cainglet (MSE, M2)  
Debinya Buenafe (MSE, M2)  
Aldrin Bendal (MSE, M2)  
Ar Jay C. Sura (MSE, M2)  
Vincent Mejarito (MSE, M2)  
Joybelle Lopez (MSE, M2)  
Yuta Louie Rola (MSE, M2)  
Jhosabel J. Samper (MSE, M1)  
Catherine Tugado (MSE, M2)  
Vladimir Sarmiento (MSE, M1)  
Ameera A. Jose (MSE, M2)  
Marjorie Navales Valenzona (MSE, M1)  
Charlene De Luna (MSE, M1)  
Mary Baby Aizeil Racho (MSE, M2)  
Rogie M. Madula (MSE, M2)  
Mayrene Uy (MSE, M2)  
Xyrus Galapia (MSE, M2)  
Bee Jay Magallanes (MSE, M1)  
Marvin B. Nalayog (MSE, M1)  
Jonah Micah L. Inguito (MSE, M1)  
Jennieva Grace E. Torremoro (MSE, M1)  
Camille Victoria Cantor (MSE, M1)

## Apprentices

Cerx Lorenz Lim  
Michelle Celebrado

## Organizational Summary

Regular Members	<b>11</b>
Student Members	
B4	<b>6</b>
B5	<b>24</b>
M1	<b>9</b>
M2	<b>38</b>
P1	<b>0</b>
P2	<b>14</b>
P3	<b>8</b>
P4	<b>2</b>
Total Number of Regular Members/Student Members	<b>112</b>
Adjunct Researcher (Postdoctoral Researchers)	<b>1</b>
Apprentices (NIP)	<b>2</b>
Apprentices (Non-NIP)	<b>0</b>

## 2. Mentoring

### Graduated 2nd Semester 2017-2018

#### *BS Physics*

##### **Raisa Mustapha**

Thesis Title: *Wavefunction spillover in GaAs/AlGaAs quantum wells*  
Adviser: Elmer S. Estacio, Ph.D.

#### *BS Applied Physics (Materials Science)*

##### **Jeremias Ibus-Armonia**

Thesis Title: *Surface enhance Raman spectroscopy of organic dyes using silver nanowires*  
Adviser: Armando Somintac, Ph.D.

##### **Ferdinand Cayabyab, Jr.**

Thesis Title: *Zinc oxide nanorods grown via hydrothermal method on aluminum nitride for photodegradation of organic dyes*  
Adviser: Armando Somintac, Ph.D.

### ***BS Applied Physics (Instrumentation)***

#### **Adonis Villagomez**

Thesis Title: *Inline spectrophotometry setup with porous silicon-based distributed bragg reflector for organic dye sensing*

Adviser: Armando Somintac, Ph.D.

#### **Jairrus Publico**

Thesis Title: *Reflectivity spectroscopy of the effects of successive etching of AlAs/AlGaAs DBR*

Adviser: Elmer S. Estacio, Ph.D.

#### **Nestor Daniel Fernandez**

Thesis Title: *Indium Addition in the BSCCO System Done by Investigation of the Bi:Sr:Ca:Cu: 2:2:3:4 Stoichiometry*

Adviser: Roland V. Sarmago, Ph.D.

### **Graduated 2nd Semester 2017-2018**

#### ***MS Physics***

#### **Karl Cedrick P. Gonzalies**

Thesis Title: *Molecular beam epitaxy growth and optoelectronic characterization of gallium arsenide on silicon (100) substrate for terahertz device applications*

Adviser: Arnel A. Salvador, Ph.D. and Elmer S. Estacio, Ph.D.

#### ***MS Materials Science and Engineering***

#### **Joybelle Lopez**

Thesis Title: *Carbon-coated porous silicon as electric double-layer capacitor*

Adviser: Armando S. Somintac, Ph.D.

#### **Cecil Angub**

Thesis Title: *Growth and Characterization of Zinc Oxide nanorods grown via hydrothermal method for supercapacitor applications*

Adviser: Armando S. Somintac, Ph.D.

#### **Myra G. Bungag**

Thesis Title: *Touchdown dynamics and wear analysis of magnetic recording head with silicon*

Co-Adviser: Arnel A. Salvador, Ph.D.

#### **Anthony Francis G. Montecillo**

Thesis Title: *Epitaxially lifted i-GaAs/n-GaAs thin film for terahertz applications*

Adviser: Armando S. Somintac, Ph.D.

## Graduated 1st Semester 2018-2019

### *BS Applied Physics (Materials)*

**Timothy Vincent T. Recla**

Thesis Title: *Fabrication and Optoelectronic characterization of P-I-N GaAs/AlGaAs*  
Adviser: Elmer S. Estacio, Ph.D. and Armando S. Somintac, Ph.D.

### *BS Applied Physics (Instrumentation)*

**Ivan Cedrick M. Verona**

Thesis Title: *Determination of pulse width and estimation of pulse-to-pulse jitter of femtosecond laser using optical autocorrelation and cross-correlation techniques*  
Adviser: Elmer S. Estacio, Ph.D.

## Mentoring Summary

Course	2 <sup>nd</sup> Sem 17-18	1 <sup>st</sup> 18-19	Total
BS Physics	1	0	1
BS Applied Physics	5	2	7
MS Physics	1	0	1
MS MSE	4	0	4

## B. Research Highlights

### 1. Papers published/accepted for publications in international peer-reviewed journals (16)

- 1) Sadia, C. P., Lopez, L. P., delos Santos, R. M., Muldera, J. E., De Los Reyes, A. E., Tumanguil, M. A. C., Que, C. T., Mag-usara, V. K., Tani, M., Somintac, A. S., Estacio, E. S., & Salvador, A. A. (2018). Epitaxial growth of p-InAs on GaSb with intense terahertz emission under 1.55- $\mu\text{m}$  femtosecond laser excitation. *Thin Solid Films*, 648, 46–49. <https://doi.org/10.1016/j.tsf.2017.12.022>
- 2) Balgos, M. H., Jaculbia, R., Prieto, E. A., Mag-usara, V. K., Tani, M., Salvador, A., Estacio, E., & Somintac, A. (2018). Surface effect of n-GaAs cap on the THz emission in LT-GaAs. *Journal of Materials Science: Materials in Electronics*, 29(14), 12436–12442. <https://doi.org/10.1007/s10854-018-9360-1>
- 3) Prieto, E. A. P., Vizcara, S. A. B., Lopez, L. P., Vasquez, J. D. E., Balgos, M. H. M., Hashizume, D., Hayazawa, N., Kim, Y., Tani, M., Somintac, A. S., Salvador, A. A., & Estacio, E. S. (2018). Intense THz emission in high quality MBE-grown GaAs film with a thin n-doped buffer. *Optical Materials Express*, 8(6), 1463. <https://doi.org/10.1364/OME.8.001463>
- 4) Kitahara, H., Yasumoto, T., Goto, D., Kato, H., Shiihara, M., Afalla, J., Mag-Usara, V., Yamamoto, K., Furuya, T., Tani, M., Estacio, E., & Bakunov, M. (2018). Sensitivity Improvement of Heterodyne Electro-Optic Sampling. In 2018 43rd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) (Vol. 2018–Septe, pp. 1–2). IEEE. <https://doi.org/10.1109/IRMMW-THz.2018.8510337>

- 5) De Los Reyes, A. E., Vasquez, J. D. E., Lopez, L. P., Bardolaza, H. R., Chang, C.-Y., Jang, D.-J., Somintac, A. S., Salvador, A. A., & Estacio, E. S. (2018). Photoluminescence and terahertz time-domain spectroscopy of MBE-grown single-layered InAs/GaAs quantum dots. In International Conference on Infrared, Millimeter, and Terahertz Waves, IRMMW-THz (Vol. 2018–Septe). <https://doi.org/10.1109/IRMMW-THz.2018.8510014>
- 6) delos Santos, R., Mag-usara, V., Tuico, A., Copa, V., Salvador, A., Yamamoto, K., Somintac, A., Kurihara, K., Kitahara, H., Tani, M., & Estacio, E. (2018). Metal-Coated <100>-Cut GaAs Coupled to Tapered Parallel-Plate Waveguide for Cherenkov-Phase-Matched Terahertz Detection: Influence of Crystal Thickness. *Journal of Infrared, Millimeter, and Terahertz Waves*, 39(6), 514–520. <https://doi.org/10.1007/s10762-018-0487-1>
- 7) Kato, H., Kitahara, H., Goto, D., Yasumoto, T., Shihara, M., Afalla, J., Mag-Usara, V., Bulgarevich, D., Escafio, C., Yamamoto, K., Furuya, T., Bakunov, M., Estacio, E., & Tani, M. (2018). Enhancement of THz EO Sampling Signal by Polarization Filtering. In International Conference on Infrared, Millimeter, and Terahertz Waves, IRMMW-THz (Vol. 2018–Septe). <https://doi.org/10.1109/IRMMW-THz.2018.8510458>
- 8) Jose, A., Montecillo, A., Lopez, J., De Los Rcyes, A., Bacaoco, M., Faustino, M. A., Cafe, A., Vasquez, J. D., Gonzales, K. C., Catindig, G. A., Somintac, A., Salvador, A., & Estacio, E. (2018). Terahertz Emission Enhancement of i/n-Gallium Arsenide Thin Film on a Porous Silicon Distributed Bragg Reflector designed at 800nm. In International Conference on Infrared, Millimeter, and Terahertz Waves, IRMMW-THz (Vol. 2018–Septe). <https://doi.org/10.1109/IRMMW-THz.2018.8510519>
- 9) Afalla, J., Gonzales, K. C., Muldera, J., Prieto, E. A., Catindig, G., Vasquez, J. D., Husay, H. A., Moriyasu, T., Kitahara, H., Bulgarevich, D., Mag-Usara, V., Furuya, T., Somintac, A., Salvador, A., Estacio, E., & Tani, M. (2018). Photo-carrier dynamics of MBE-grown GaAs on Silicon studied by optical-pump terahertz-probe. In 2018 43rd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) (Vol. 2018–Septe, pp. 1–2). IEEE. <https://doi.org/10.1109/IRMMW-THz.2018.8510368>
- 10) Angub, M. C. M., Vergara, C. J. T., Husay, H. A. F., Salvador, A. A., Empizo, M. J. F., Kawano, K., Minami, Y., Shimizu, T., Sarukura, N., & Somintac, A. S. (2018). Hydrothermal growth of vertically aligned ZnO nanorods as potential scintillator materials for radiation detectors. *Journal of Luminescence*, 203, 427–435. <https://doi.org/10.1016/j.jlumin.2018.05.062>
- 11) De Vero, J.C., Lee, D., Shin, H., Namuco, S.B., Hwang, I., Sarmago, R.V., Song, J.H. (2018). Influence of deposition conditions on the growth of micron-thick highly c-axis textured superconducting GdBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> films on SrTiO<sub>3</sub> (100). *Journal of Vacuum Science & Technology A Vacuum Surfaces and Films* 36(3):031506. <https://doi.org/10.1116/1.5019393>
- 12) Agulto, V.C., Empizo, M.J., Kawano, K., Minami, Y., Yamanoi, K., Sarukura, N., Yago, A.C., Sarmago, R.V. (2018). Two-step Fabrication of ZnO-PVP Composites with tunable visible emissions. *Journal of Optical Materials*, 76, 317-322. <https://doi.org/10.1016/j.optmat.2017.12.048>
- 13) Bardolaza, H.R., Vasquez, J.D., Bacaoco, M.Y., de los Reyes, A.E., Lopez Jr., L.P., Somintac, A.S., Salvador, A.A., Estacio, E.S., Sarmago, R.V. (2018). Temperature dependence of THz emission and junction electric field of GaAs–AlGaAs modulation-doped heterostructures with different i-AlGaAs spacer layer thicknesses. *Journal of Materials Science: Materials in Electronics* 29, 8760–8766. <https://doi.org/10.1007/s10854-018-8892-8>
- 14) Agulto, V.C., Empizo, M.J.F., Kawano, K., Salazar, K.A., Minami, Y., Yamanoi, K., Shimizua, T., Yago, A.C., Sarmago, R.V., Sarukura N. (2018). Combination of post-growth treatments and their effects on

ZnO microrods as potential UV phosphors. Elsevier Journal of Optical Materials, 86, 12-17. <https://doi.org/10.1016/j.optmat.2018.09.018>

- 15) Gonzales, K., Omambac, K., Prieto, E., Afalla, J., Balgos, M., Jacubia, R., Somintac, A., Salvador, A., & Estacio, E. (2018). Terahertz Emission of Gallium Arsenide on Textured p-type Silicon (100) Substrates Grown via Molecular Beam Epitaxy. Journal of Physics and Its Applications, 1(1), 7-9. doi:<http://dx.doi.org/10.14710/jpa.v1i1.3908>
- 16) Ballesteros, L. I., Vergar, C. J., & Somintac, A. (2018). Fluorine-doped SnO<sub>2</sub> thin film as chemiresistive gas sensor for room temperature monitoring of fish freshness. PISIKA - Journal of the Physics Society of the Philippines, 1(1). <https://doi.org/10.20526/pisika.01a18.10>

## **2. Paper published in local journal (0)**

### **3. International conference presentations (WITHOUT full paper, 20)**

- 1) Elmer Estacio. "Structural and Optical Properties of Nanostructured Silicon for Terahertz Applications." Presented at the 10th Asian Conference on Ultrafast Phenomena, University of Hong Kong in Hong Kong. January 7-10, 2018.
- 2) Alexander De Los Reyes. "Terahertz Emission from p-type and n-type Indium Arsenide under an External 650 mT Magnetic Field." Presented at the 10th Asian Conference on Ultrafast Phenomena, University of Hong Kong in Hong Kong. January 7-10, 2018.
- 3) Maria Angela B. Faustino. "Extraordinary terahertz transmission from SI-GaAs deposited with sub-wavelength metal array." Presented at the 10th Asian Conference on Ultrafast Phenomena, University of Hong Kong in Hong Kong. January 7-10, 2018.
- 4) Arnel Salvador. "Luminescence and Photo-carrier Transport in Silicon Nanowires Fabricated via Single- and Two-Step Silver-Assisted Chemical Etching." Presented at the 10th Asian Conference on Ultrafast Phenomena, University of Hong Kong in Hong Kong. January 7-10, 2018.
- 5) Arven I. Cafe, Joybelle M. Lopez, Alexander E. De Los Reyes, Horace Andrew F. Husay, Lorenzo P. Lopez, Jr., Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. "Enhanced Terahertz Emission from meso-PSi/Si with Fabry-Perot Modes Tuned at 800nm." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 6) Horace Andrew Husay, Lauren Ida Ballesteros, Jeremias Armonia, Debinya Buenafe, Juferd Cayabyab, Mary Donnabelle Balela, Ian Jasper Agulo, Elmer Estacio, Arnel Salvador, Armando Somintac. "Detection of Methylene Blue Organic Dye Using Silver Nanowires as Surface-Enhanced Raman Spectroscopy Substrates." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 7) Luce Vida Sayson, Menandro Marquez, Joybelle Lopez, Elmer Estacio, Arnel Salvador, Armando Somintac. "Effects of Annealing on the Copper Oxide-based Pseudocapacitor Electrode." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 8) Joybelle M. Lopez, Alexander E. De Los Reyes, Arven I. Cafe, Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. "Controlled Decomposition of Carbon on Porous Silicon Templates for Electrochemical Capacitors." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 9) Vladimir Sarmiento, Arven Cafe, Joybelle Lopez, Efren Suratos, Elmer Estacio, Armando Somintac. "Photocatalytic Degradation of Methylene Blue Using Oxidized Porous Silicon." Presented at 2018 Annual



Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.

- 10) Yuta Louie Rola, Arven I. Cafe, Christopher Jude Vergara, Debinya Buenafe,, Horace Andrew Husay, Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. "Zinc Oxide Nanorods Grown on ZnO – CuO Composite Seed Layer for Photodegradation Application." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 11) Debinya B. Buenafe, Horace Andrew F. Husay, Efren Suratos, Christopher Jude Vergara, Arven I. Cafe, Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. "Visible-Light Assisted Degradation of Methylene Blue Using ZnO/CuO Composite Films Grown Through Spray Pyrolysis." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 12) Raymund C. Veloz, Ma. Cecilia A. Angub, Horace Andrew F. Husay, Erick John Carlo D. Solibet, Melvin John F. Empizo, Keisuke Kawano, Nobuhiko Sarukura, Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. "Light-Emitting and Conducting Zinc Oxide Multilayer Fabricated on p-Silicon Substrate." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 13) Aldrin Bendal, Arven Cafe, Joybelle Lopez, Arnel Salvador, Elmer Estacio, Armando Somintac. "Flexible Strain Sensor Based on Piezoresistive Zinc Oxide Thin Film." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 14) Anthony Montecillo, Gerald Angelo Catindig, Alexander De Los Reyes, Angela Faustino, John Daniel Vasquez, Arnel Salvador, Armando Somintac, Elmer Estacio. "Terahertz Emission from Epitaxially Lifted-Off i-GaAs/n-GaAs Thin Films Investigated Using Reflection-Mode Terahertz Time-Domain Spectroscopy." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 15) Vernalyn Copa, Anthony Tuico, John Paul Ferrolino, Rommel Jagus, Kerphy Liandro Patrocenio, Gerald Angelo Catindig, Karl Cedric Gonzales, Elizabeth Ann Prieto, Elmer Estacio, Armando Somintac, Arnel Salvador. "Characterization of Oxidized AlAs Layers in AlAs/AlGaAs Mesa Structures via Optical Profilometry." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 16) Ameera A. Jose, Paolo I. Elimanco, Rinlee Butch Cervera. "Sol-Gel Synthesis of Nickel Oxide Nanoparticles." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018.
- 17) Rommel Jagus, Horace Andrew Husay, Neil Irvin Cabello, John Paul Ferrolino, Gerald Angelo Catindig, Karl Cedric Gonzales, Elizabeth Ann Prieto, Kerphy Liandro Patrocenio, Elmer Estacio, Armando Somintac, Arnel Salvador. "Strain in Thermally-Oxidized GaAs/AlGaAs Multiple Quantum Well Heterostructures as Investigated by micro-PL and micro-Raman Spectroscopy." Presented at 2018 Annual Meeting of the Physical Society of the Republic of China (Taiwan), National Taiwan University, Taipei, Taiwan, January 24-26, 2018
- 18) Ameera Al-rashid Jose, Anthony Montecillo, Joybelle Lopez, Alexander De Los Reyes, Miguel Bacaoco, Maria Angela Faustino, Arven Cafe, John Daniel Vasquez, Karl Cedric Gonzales, Gerald Angelo Catindig, Armando Somintac, Arnel Salvador, Elmer Estacio. "Enhanced terahertz emission of gallium arsenide thin film with integrated porous silicon distributed Bragg reflector," 79th Japan Society of Applied Physics (JSAP)-OSA Autumn meeting 2018. Nagoya Congress Center, Nagoya, Aichi, Japan, September 18-21, 2018
- 19) Horace Andrew Husay, Jeremias Ibus-Armonia, Debinya Buenafe, Ferdinand Cayabyab, Lauren Ida Ballesteros, Nathaniel De Guzman, Mary Donnabelle Balela, Elmer Estacio, Arnel Salvador, Armando

Somintac. "Detection and trace analysis of Rhodamine B using silver nanowires as surface-enhanced Raman spectroscopy substrates." Presented at 2nd ICTP Asian Network School and Workshop on Complex Condensed Matter Systems." Suranaree University of Technology, Nakhon Ratchasima, Thailand. November 5-9, 2018.

- 20) Gerald Angelo Catindig, Neil Irvin Cabello, Karl Cedric Gonzales, Elizabeth Ann Prieto, Rommel Jagus, Kerphy Liandro Patrocenio, Lorenzo Lopez Jr., Elmer Estacio, Arnel Salvador. "Effects of varying tensile strain on the terahertz emission from epitaxially-lifted gallium arsenide quantum wells bonded onto flexible plastic substrates." Presented at 2nd ICTP Asian Network School and Workshop on Complex Condensed Matter Systems." Suranaree University of Technology, Nakhon Ratchasima, Thailand. November 5-9, 2018.

#### **4. Local conference papers (With full paper in print proceedings, 41)**

- 1) Philippe Martin Baguio Tingzon, Neil Irvin Cabello, John Jairus Eslit, Kevin Cook, Jonas Kapraun, Marc Rosales, Armando Somintac, Arnel Salvador, Elmer Estacio, Connie Chang-Hasnain. "*Fabrication of high contrast gratings (HCG) MEMS-tunable 1060 nm VCSELs with 32 nm electrostatic tuning range.*" 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 2) Raymund Curioso Veloz, Ma. Cecilia Moralde Angub, Horace Andrew Fernandez Husay, Erick John Carlo De Guzman Solibet, Melvin John Fernandez Empizo, Keisuke Kawano, Nobuhiko Sarukura, Arnel Angud Salvador, Armando Soriano Somintac. "*Current-voltage characteristics of zinc oxide nanorods hydrothermally grown on a p-type silicon substrate.*" 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 3) Karl Cedric Paguntalan Gonzales, Elizabeth Ann Puran Prieto, Gerald Angelo R Catindig, Mae Agatha Cepeda Tumanguil-Quitoras, Alexander E De Los Reyes, Maria Angela B Faustino, Horace Andrew F Husay, Armando Soriano Somintac, Arnel Angud Salvador, Elmer Surat Estacio. "*Terahertz emission in GaAs grown on Si(100) at different substrate temperatures.*" 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 4) Bess Garcia Singidas, Horace Andrew Husay, Armando Somintac, Elmer Estacio, Arnel Salvador, Roland Sarmago. "*Charge transfer in graphene on GaAs probed by Raman spectroscopy.*" 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 5) Alexander E De los Reyes, John Daniel E Vasquez, Lorenzo P Lopez, Jr, Hannah R Bardolaza, Che-Yu Chang, Der-Jun Jang, Armando S Somintac, Arnel A Salvador, Elmer S Estacio. "*Temperature-dependent photoluminescence and terahertz time-domain spectroscopy of single-layered InAs/GaAs quantum dots grown via molecular beam epitaxy.*" 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 6) Anthony Rustia Tuico, Philippe Martin Tingzon, Elizabeth Ann Prieto, Kevin Cook, Marc Rosales, Armando Somintac, Arnel Salvador, Elmer Estacio, Connie Chang-Hasnain. "*Fabrication of wavelength-tunable and small-signal modulated VCSEL emitting at the 850 nm regime.*" 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 7) Arvin Jay Escolano, Raymund Veloz, Elmer Estacio, Arnel Salvador, Armando Somintac. Demonstration of the infrared detection of pyroelectric SnO<sub>2</sub>-Fe<sub>2</sub>O<sub>3</sub> composite films. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 8) Genes Maylem, Lauren Ida Ballesteros, Joybelle Lopez, Luce Vida Sayson, Horace Andrew Husay, Armando Somintac. Fluorine-doped tin oxide films for supercapacitor applications. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 9) Erick John Carlo De Guzman Solibet, Raymund Curioso Veloz, Ma. Cecilia Moralde Angub, Horace Andrew Fernandez Husay, Melvin John Fernandez Empizo, Keisuke Kawano, Toshihiko Shimizu, Nobuhiko

- Sarukura, Arnel Angud Salvador, Armando Soriano Somintac. A comparative study of ZnO thin film and nanorod samples prepared by wet-chemical methods. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 10) Maria Hermina Balgos, Elizabeth Ann Prieto, Rafael Jaculbia, Elmer Estacio, Arnel Salvador, Yousoo Kim, Norihiko Hayazawa, Armando Somintac. Low temperature scanning tunneling microscopy and spectroscopy of undoped LT-GaAs. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 11) Miguel Yee Bacaoco, Elizabeth Ann P Prieto, Karl Cedric P Gonzales, Horace Andrew F Husay, John Daniel E Vasquez, Alexander E De Los Reyes, Maria Angela B Faustino, Arnel A Salvador, Armando S Somintac, Elmer S Estacio. Optical and structural characterization of LTG-GaAs correlating excess As with THz emission. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 12) Jeremias Ibus Armonia, Horace Andrew F Husay, Debinya B Buenafe, Laureen Ida M Ballesteros, Ferdinand T Cayabyab, Adonis Villagomez, Mary Donnabelle L Balela, Nathaniel de Guzman, Armando S Somintac. Surface enhanced Raman scattering of rhodamine B using silver nanowires. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 13) Erick John Carlo De Guzman Solibet, Raymund Curioso Veloz, Horace Andrew Fernandez Husay, Melvin John F. Empizo, Keisuke Kawano, Kohei Yamanoi, Nobuhiko Sarukura, Elmer Surat Estacio, Arnel Angud Salvador, Armando Soriano Somintac. Optical properties of undoped and Al-doped ZnO thin films deposited via spray pyrolysis technique. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 14) Adonis Villagomez, Joybelle Lopez, Arvin Jay Escolano, Arven Cafe, Jeremias Armonia, Ferdinand Cayabyab, Elmer Estacio, Arnel Salvador, Armando Somintac. In-line photometer with pSi-based DBR for wavelength-selective transmittance measurement of methylene blue. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 15) Ameera Jose, Anthony Montecillo, Joybelle Lopez, Alexander De Los Reyes, Miguel Bacaoco, Maria Angela Faustino, Arven Cafe, John Daniel Vasquez, Karl Cedric Gonzales, Gerald Angelo Catindig, Armando Somintac, Arnel Salvador, Elmer Estacio. Terahertz emission of a 550nm-thick epitaxially lifted-off gallium arsenide thin film integrated on a porous silicon distributed Bragg reflector. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 16) Luce Vida Armada Sayson, Arnel A Salvador, Armando S Somintac. Effects of film thickness on the electrochemical performance of copper oxide electrode. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 17) Ferdinand Tamayo Cayabyab, Jr., Debinya Buenafe, Adonis Villagomez, Jeremias Ibus-Armonia, Erick John Carlo Solibet, Horace Andrew Husay, Rontgen Gapusan, Ma. Cecilia Angub, Ron Darell Aves, Anthony Tuico, Vernalyn Copa, Arnel Salvador, Elmer Estacio, Armando Somintac. Photodegradation of organic dyes using ZnO nanorods grown on AlN film. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 18) Deborah Anne Opaon Lumantas, Alexander De Los Reyes, Joselito O. Muldera, Lorenzo P. Lopez, Jr, Armando S. Somintac, Arnel A. Salvador, Elmer S. Estacio. Drift-diffusion in InAs based on ambipolar transport. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
  - 19) Raisa Mustapha, Alexander De Los Reyes, John Daniel Vasquez, Miguel Bacaoco, Arnel Salvador, Armando Somintac, Elmer Estacio. Effect of well width on the wavefunction spillover in GaAs/AlGaAs quantum wells. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018

- 20) Joybelle M. Lopez, Arven I. Cafe, Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. Graphitic carbon/porous silicon composite electrode for electric double-layer capacitor. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 21) Michaelrey Cainglet, Arnel A. Salvador, Armando S. Somintac. Stability and sensitivity of ammonia sensor based on porous silicon coated tin oxide. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 22) Lauren Ida Monzon Ballesteros, Jamela Pangasinan, Charlene De Luna, Rogie Madula, Mary Baby Aizeil Racho, Armando Somintac, Arnel Salvador. Raman spectroscopy of pristine and PEI-doped graphene. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 23) Jairrus Braga Publico, Alexander E. De Los Reyes, John Daniel E. Vasquez, Karl Cedric V. Gonzales, Gerald Angelo R. Catindig, Elizabeth Ann P. Prieto, Rommel Jagus, Kerphy Liandro Patrocenio, Elmer S. Estacio, Arnel Salvador, Armando Somintac. Reflectivity spectroscopy of the effects of successive etching of AlAs/AlGaAs Distributed Bragg Reflectors. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 24) Aldrin S Bendal, Arven I Cafe, Horace Andrew F Husay, Elmer S Estacio, Arnel A Salvador, Armando S Somintac. Multifunctional sensor based on piezoresistive property of zinc oxide film for strain and temperature monitoring. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 25) Kerphy Liandro Magpulong Patrocenio, Anthony Tuico, Horace Andrew Husay, Philippe Martin Tingzon, Gerald Catindig, Karl Cedric Gonzales, Rommel Jagus, John Paul Ferrolino, John Daniel Vasquez, Elizabeth Ann Prieto, Armando Somintac, Arnel Salvador, Elmer Estacio. Electroluminescence of unoxidized 847 nm vertical cavity surface-emitting laser with AlAs/Al<sub>0.22</sub>Ga<sub>0.78</sub>As distributed Bragg reflectors. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 26) Horace Andrew Fernandez Husay, Jeremias Ibus-Armonia, Lauren Ida Monzon Ballesteros, Debinya Banisal Buenafe, Ferdinand Tamayo Cayabyab, Jr, Nathaniel T De Guzman, Mary Donnabelle L Balela, Elmer Surat Estacio, Arnel Angud Salvador, Armando Soriano Somintac. Fluorescence suppression and surface-enhanced Raman scattering (SERS) in rhodamine B dye using silver nanowires as SERS substrates. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 27) Vladimir Manamtam Sarmiento, Anne Marie Reyes, Arven Cafe, Horace Andrew Husay, Magdaleno Vasquez, Jr, Elmer Estacio, Arnel Salvador, Armando Somintac. Effects of argon and oxygen plasma treatment on optoelectronic properties of silicon nanowires. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2019
- 28) Verdad C. Agulto, Melvin John F. Empizo, Keisuke Kawano, Kloudene A. Salazar, Yuki Minami, Kohei Yamanoi, Allan Cchristopher C. Yago, Nobuhiko Sarukura, Roland V. Sarmago. Effects of polymer coating and thermal annealing on the structural and optical properties of ZnO microrods. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 29) Joseph Aban de Mesa, Jessa Jayne Miranda, Angelo Rillera, Roland Sarmago, Wilson Garcia. Femtosecond pulsed laser deposition of CeO<sub>2</sub> thin films on silicon (100) substrates. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 30) Xyrus A. Galapia, Lawrence G. Magsayo, Roland V. Sarmago. Suspension stabilization for improved particle electrophoresis. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018

- 31) Jerome C. Taguba, Mayrene A. Uy, Jenniva E. Torremoro, Giselle S. Reyes and Roland V. Sarmago. Interaction of YBCO and PbO<sub>2</sub> particles in acetone. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 32) Kloudene A. Salazar, Verdad C. Agulto, Melvin John F. Empizo, Keisuke Kawano, Yuki Minami, T Shimizu, Nobuhiko Sarukura, Vallerie Ann I. Samson, RV Sarmago. Synthesis and characterization of hydrothermally-grown ZnO:Fe microrods. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 33) Nestor Daniel Bermuda Fernandez, Roland Villano Sarmago. Indium addition to the BSCCO system in the 2234 stoichiometry. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 34) Angelo P. Rillera, Ysabella Kassandra F. Ong, Roland V. Sarmago. Surface morphology and composition of CeO<sub>2</sub> deposits on Haynes 230 substrates. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 35) Francesca Isabel Narciso de Vera, Carlo A Arcilla, Roland Villano Sarmago. Superconducting properties of In-doped Bi-2212 films via sedimentation method. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 36) Jennieva Grace Torremoro, Ysabella Kassandra Fajardo Ong, Angelo Rillera, Mayrene Uy, Roland Sarmago. Behavior of CeO<sub>2</sub> particles in various organic-based solvents. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 37) Angelo Gabriel Nueva, Bess Singidas, Roland Sarmago. Effect of annealing temperature on transfer process of graphene. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 38) Camille M. Cantor, Roland V. Sarmago. Fabrication of Bi-2212 sedimentation films using KCl solution. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 39) Mayrene A. Uy, Jennieva E. Torremoro, Giselle S. Reyes, Roland V. Sarmago. Colloidal stability and film morphology of as-deposited YBCO in iodine-acetone medium. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 40) Rommil Bacurin Emperado, Jessa Jayne Miranda, Nestor Fernandez, Wilson Garcia, Roland Sarmago. Ultrafast pulsed laser deposition of BSCCO target on silicon substrate. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018
- 41) Jonalds L. Tacneng, Christian Loer T. Llemit, Francesca De Vera, Nestor Fernandez, Carlo Arcilla, Roland V. Sarmago. Preliminary Investigation of indium substitution on Sr-site of Bi<sub>2</sub>Sr<sub>2</sub>Ca<sub>2</sub>Cu<sub>3</sub>O<sub>10+δ</sub> superconductor. 2018 Samahang Pisika ng Pilipinas Proceedings. Citystate Asturias Hotel, Puerto Princesa City, Palawan. June 6-9, 2018

## **5. Local conference papers (Without full paper in print proceedings, 4)**

### **Samahang Pisika ng Visayas at Mindanao**

Elyzza June L. Descallara, Mike Angelo C. Kua, Christian A. Bacala, Melchor J. Potestas and Arnel A. Salvador, Elmer S. Estacio, Armando S. Somintac. Enhanced transparency and conductivity of tin oxide via fluorine-doping. Presented at the 20th Samahang Pisika ng Visayas at Mindanao National Physics Conference. Butuan City, Philippines. October 19-21, 2018

Ebenezer Baraud, Nam Quennie S. Broca, Orly Sarcauga, Lorraine Joule B. Estrada, Melchor Potestas, Elmer S. Estacio, Arnel A. Salvador, Armando S. Somintac. Rhodamine B photodegradation using spray-pyrolyzed Zinc oxide thin-films catalyst. Presented at the 20th Samahang Pisika ng Visayas at Mindanao National Physics Conference. Butuan City, Philippines. October 19-21, 2018

### Symposium on Advanced Spectroscopic Techniques

Arnel A. Salvador. Photoluminescence and Raman Spectroscopy of Oxidized Structures. Symposium on Advanced Spectroscopic Techniques. Institute of Mathematical Sciences and Physics, University of the Philippines Los Banos. September 18-21, 2018 [Invited Speaker]

Elmer S. Estacio. Current progress on the development of photoconductive antenna devices for terahertz applications. Symposium on Advanced Spectroscopic Techniques. Institute of Mathematical Sciences and Physics, University of the Philippines Los Banos. September 18-21, 2018 [Invited Speaker]

## 6. NIP funded projects (5)

Project Leader	Title	Period
Roland V. Sarmago, Ph.D.	High Tc Superconductors on CeO Buddered Substrate	Jan 1, 2018 - Dec 1, 2018
Elmer Estacio, Ph.D.	Development of a Terahertz Time-Domain Spectroscopy Set-up Based on a 1550 nm Femtosecond Fiber Laser	Jan 1, 2018 - Dec 1, 2018
Armando Somintac, Ph.D.	Terahertz Properties of Epitaxially Lifted Off Gallium Arsenide Thin Films	Jan 1, 2018 - Dec 1, 2018
Arnel Salvador, Ph.D.	Raman and Optical Studies of Graphene on SiO <sub>2</sub> and Polymer Substrates	Jan 1, 2018 - Dec 1, 2018
Vallerie Ann I. Samson, Ph. D.	Synchrotron Microprobe Analyses of REE-Rich Mineral Allanite - a Natural Analogue for Radiological Waste Disposal Material	Jan 1, 2018 - Dec 1, 2018

## 7. Non-NIP Funded Projects (10)

Project Leader	Title	Period	Amount (PhP)	Indirect Cost (PhP)
Elmer Estacio	OVPAA-EIDR-C06-004 Program: "Cost-effective Sensors and Devices to Understand Climate Change in the Philippines Using Archaeological and Present Data" Project: "Creating cost-effective sensors for IR applications"	Mar 2, 2016 -Mar 20, 2018	14,959,895.25	320,000.00

	PCARI IIID-2015-13 “3rd-Generation VCSEL for Resilient Communication Networks (3V-ReCoN)”	Jun 1 2016 to May 31 2018	166,531,937.42	8,258,728.32
	OVCRD Grant 161604 “Investigation of the effects of an external magnetic field on the terahertz radiation mechanism in GaAs and InAs”	Aug 1 2016 to Jul 31 2017	300,000.00	NA
	PCIEERD 04001 “Ultrafast MBE-grown Terahertz Photoconductive Antenna Devices”	Aug 1 2017 to Jul 31 2018	14,974,286.00	3,400,000.00
	PCIEERD 03544 “Development of a Raman Microscopy and Spectroscopy (RMS) Setup”	Sep 1 2016 to Aug 31 2017	8,388,153.60	2,575,000.00
Arnel Salvador	PCARI IIID-2016-010 “Chemical and Environment Portable Sensor Technologies”	Apr 1 2017 to Mar 31 2019	85,056,391.53	6,436,641.92
Roland Sarmago	OVCRD-OEC; “Dispersion of BSCCO & YBCO Particles in Organic Solvents with Additives	Mar 2018 to Sep 2019	300,000.00	NA
	PCIEERD GIA 03547 “Fabrication of Highly c-axis Oriented YBCO Superconducting Thin Films by Sedimentation Deposition”	Mar 1 2017 to Feb 28 2019	16,387,305	200,919.49
	Effect of Doping and Annealing Temperatures on the optical, structural and magnetic properties of ZnO nanostructures	Aug 2018 to Jan 2020	325,000	NA

Total Amount of Non-NIP Funded Projects: **Php 312,535,834.3**

### 8. Major equipment acquired/ upgraded (15)

Equipment & Description	Cost (Php)	Mode of Acquisition	Project Leader
Femtosecond fiber laser and accessories	4,400,000	PCIEERD GIA 04001	Elmer Estacio
Optical Table and Accessories	199,890.0		
Mechanical delay stage and accessories	199,870		
Bias power supply and accessories	100,000		
Critical Point Dryer	2,000,000	PCARI IIID-2015-13	Arnel Salvador
Fumehood (2)	445,000	PCARI IIID-2016-010	
Microliter pump	29,950		
Two Channel function generator	938,966		
Surge Protector and Auto voltage separator	203,060		
Lock-in Amplifier	475,000	PCIEERD GIA 03547	Roland Sarmago
Sonicator	97,360		
pH Multiparameter	64,108		
AC/DC Current Sources	950,000		
Cryo Refrigerator	3,280,000	UP System	
UV Laser	2,862,318		

<b>Total</b>	<b>Php 17,121,522</b>
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**9. Research travels abroad by NIP faculty & student researchers (27)**

<b>NIP Personnel</b>	<b>Purpose</b>	<b>Place</b>	<b>Dates</b>	<b>Mode of Exchange</b>
Maria Herminia Balgos	International Program Associate	RIKEN, Wako, Saitama Japan	October 2016 - October 2018	MOA
Vernalyn Copa	Visiting Researcher of PCARI IIID-2016-010 Project	University of California Berkeley, Berkeley, California, USA	August 13, 2017 - April 2018	MOA
Lorenzo Lopez, Jr.	Visiting Researcher of PCARI IIID-2016-010 Project	University of California Berkeley, Berkeley, California, USA	August 13, 2017 - April 2018	MOA
Neil Irvin Cabello	Visiting Researcher of PCARI IIID-2015-013 Project	University of California Berkeley, Berkeley, California, USA	October 26, 2017 - April 15, 2018	MOA
Philippe Martin Tingzon	Visiting Researcher of PCARI IIID-2015-013 Project	University of California Berkeley, Berkeley, California, USA	November 3, 2017 - March 3, 2018	MOA
Vallerie Ann Samson	European X-ray Spectrometry Conference	Slovenia	June 24-29, 2018	



Alexander De Los Reyes	Research Visit	University of Fukui, Fukui, Japan	July 2 - August 3, 2018	MOA
Elmer Estacio	Research Visit	University of Fukui, Fukui, Japan	July 2 - August 3, 2018	MOA
Carlo Solibet	Visiting researcher	Institute of Laser Engineering, Osaka University, Japan	July 16 - August 1, 2018	MOA
Gerald Angelo Catindig	Visiting researcher	Institute of Laser Engineering, Osaka University, Japan	July 16 - August 1, 2018	MOA
Kloudene Salazar	Institute of Laser Engineering, Research Visit	Osaka University, Japan	July 17-31, 2018	
Roland V. Sarmago	Institute of Laser Engineering, Research Visit	Osaka University, Japan	July 17-31, 2018	
Laureen Ida Ballesteros	Visiting researchers of PCARI IIID-2016-010 Project	University of California Berkeley, Berkeley, California, USA	July 21 - December 20, 2018	MOA
Regine Loberternos	Visiting researchers of PCARI IIID-2016-010 Project	University of California Berkeley, Berkeley, California, USA	July 21 - December 20, 2018	MOA
Debinya Buenafe	ASEAN Workshop on X-Ray Tomography	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	August 20-23, 2018	Personal
Genes Maylem	ASEAN Workshop on X-Ray Tomography	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	August 20-23, 2018	Personal
Vallerie Ann Samson	ASEAN Workshop on X-Ray Tomography	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	August 20-23, 2018	Personal
Deborah Lumantas	Visiting researcher	Advanced Photonics Research Institute, Gwangju Institute of Science and Technology	September 4 - October 31, 2018	MOA
Vallerie Ann Samson	Visiting Researcher, Beamtime Experiments	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	October 22-23, 2018	MOA
Kloudene Salazar	Visiting Researcher, Beamtime Experiments	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	October 22-23, 2018	MOA

Jonah Micah Inguito	Visiting Researcher, Beamtime Experiments	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	October 22-23, 2018	MOA
Bess Singidas	Visiting Researcher, Beamtime Experiments	Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand	October 22-23, 2018	MOA
Jerome Taguba	4th ICTP Asian Network School and Workshop on Complex Condensed Matter Systems	Suranaree University of Technology, Nakhon Ratchasima, Thailand	November 5-9, 2018	Personal
Bess Singidas	5th ICTP Asian Network School and Workshop on Complex Condensed Matter Systems	Suranaree University of Technology, Nakhon Ratchasima, Thailand	November 5-9, 2018	Personal
Gerald Angelo Catindig	6th ICTP Asian Network School and Workshop on Complex Condensed Matter Systems	Suranaree University of Technology, Nakhon Ratchasima, Thailand	November 5-9, 2018	Personal
Kloudene Salazar	The 10 <sup>th</sup> International Conference on Photonics & Applications	Ha Long City, Vietnam	November 11- 15, 2018	
Roland V. Sarmago	The 10 <sup>th</sup> International Conference on Photonics & Applications	Ha Long City, Vietnam	November 11- 15, 2018	

### 10. Visiting researchers (6)

Visitor, affiliation and email address	Purpose/Duration of visit	NIP Personnel Contact Person	Mode of Exchange
Norihiko Hayazawa, RIKEN- Japan, hayazawa@riken.jp	NIP-RIKEN Collaboration / November 20-25, 2018	Elmer S. Estacio	MOA between RIKEN & NIP
Masahiko Tani, tani@fir.u- fukui.ac.jp	November 20-21, 2018	Elmer S. Estacio	MOA between Fukui University and National Institute of Physics
Masaki Shiihara, shiihara@fir.u-fukui.ac.jp	November 21 - December 19, 2018		
Miezel Talara, miezel@fir.u- fukui.ac.jp	Affiliation: Research Center for Development of Far- Infrared Region, University of Fukui (FIR-FU)		
Valynn Katrine Mag-usara, valynn@fir.u-fukui.ac.jp			
Jessica Afalla, jessica@fir.u- fukui.ac.jp			

**11. MOA's entered with local or foreign institutions and other external collaborators (1)**

<b>Institution</b>	<b>Title of Research and Duration</b>	<b>NIP Personnel/ Contact Person</b>
Synchrotron Light Research Institute, Thailand	Understanding the Luminescence of Fe-doped and Cu-doped ZnO microrods via X-ray absorption	Vallerie Ann I. Samson, Ph. D.

**C. Extension Work Highlights**

**Research Interns/ OJT's (Non-NIP), for trainings held at NIP (62)**

High School Students under Workshop on Raman Microscopy and Spectroscopy; On April 28, 2018; NIP contact person: Dr. Armando S. Somintac

Christine Ann G. Faraon (Barangka National High School)

Lara Joy C. Clemente (Montessori De Sagrada Familia)

Undergraduate student from the Polytechnic University of the Philippines; under Workshop on Raman Microscopy and Spectroscopy; On April 28, 2018; NIP contact person: Dr. Armando S. Somintac

Reynold V. Luna

Undergraduate students from the University of the Philippines-Diliman; under Workshop on Raman Microscopy and Spectroscopy; On April 28, 2018; NIP contact person: Dr. Armando S. Somintac

Glenson R. Panghulan

Melanie M. Martinez

Mary Donnabelle Balela

Charlene De Luna

Salvacion Orgen

High School Students under Workshop on Raman Microscopy and Spectroscopy; On May 12, 2018; NIP contact person: Dr. Armando S. Somintac

Lara Joy C. Clemente (MDSF)

Christine Ann G. Faraon (BNHS)

Loida Ann T. Dagami (SPNHS)

Undergraduate students from the Polytechnic University of the Philippines; under Workshop on Raman Microscopy and Spectroscopy; On May 12, 2018; NIP contact person: Dr. Armando S. Somintac

Reynold V. Luna

Floro Junior Roque

Undergraduate student from the De La Salle University; under Workshop on Raman Microscopy and Spectroscopy; On May 12, 2018;

NIP contact person: Dr. Armando S. Somintac

Normie Jean Sajor

Undergraduate student from the University of the Philippines - Baguio; under Workshop on Raman Microscopy and Spectroscopy; On May 12, 2018;

NIP contact person: Dr. Armando S. Somintac

May Angelu L. Madarang

Undergraduate students from the University of the Philippines - Diliman; under Workshop on Raman Microscopy and Spectroscopy; On May 12, 2018;

NIP contact person: Dr. Armando S. Somintac

Maria Janine D. Manuzon

Clarene May Tuballa

Desiree Mae Sua-an

Jazer Jose Taganon

Rogie M. Madula

Charlene De Luna

Undergraduate students from the University of the Philippines – Los Baños; under Workshop on Raman Microscopy and Spectroscopy; On May 19, 2018; NIP contact person: Dr. Armando S. Somintac

Maris Asuncion L. Baylon

Gabrielle Lyora M. Buncio

John Daryl B. Lagdameo

Anna Rose Ramos

Nikki Rose Esguerra

Reynaldo Pareja, Jr.

Ronamiel A. Almeda

Undergraduate students from the University of the Philippines – Diliman; under Workshop on Raman Microscopy and Spectroscopy; On May 26, 2018; NIP contact person: Dr. Armando S. Somintac

Aldrin Tan

Eva M. Mogel

Mary Grace Lanwang

Flordeliza Llaneta

Mark Kevin R. Dawisan

Undergraduate students from the University of the Philippines – Manila; under Workshop on Raman Microscopy and Spectroscopy; On May 26, 2018; NIP contact person:

Dr. Armando S. Somintac

Ralph Thomas Maestre

Undergraduate student from the De La Salle University - Manila; under Open/Free Raman Characterization; On August 18, 2018;

NIP contact person: Dr. Armando S. Somintac

Normie Jean Sajor

Undergraduate student from the University of the Philippines - Diliman; under Workshop on Raman Microscopy and Spectroscopy; On August 18, 2018;

NIP contact person: Dr. Armando S. Somintac

Roma Lopez

Undergraduate student from the De La Salle University - Manila; under Workshop on Raman Microscopy and Spectroscopy; On May 26, 2018;

NIP contact person: Dr. Armando S. Somintac

Arturo V. Salvador

Undergraduate student from Philippine Normal University (PNU); Duration: April 26 to June 19, 2018; NIP contact person: Wilson O. Garcia

Jimnoel Quijano

Undergraduate students from Mindanao State University – Iligan Institute of Technology

Ebenezer Barauda

Nam Quennie S. Broca

Orly Sarcauga

Lorraine Joule B. Estrada

Elyzza June L. Descallara

Mike Angelo C. Kua

Christian A. Bacala

Undergraduate students from Mindanao State University – Iligan Institute of Technology; under Summer Immersion Program; Duration: June 14 to July 26, 2018; NIP contact person: Roland V. Sarmago

Roger G. Pabuaya Jr.

Mary Mel B. Baynosa

Angelica Pauline C. De Asis

Romaisa H. Ali

Garry T. Superales

Maria Teresa A. Batocael

Ethel L. Limpahan

Nizel May F. Sumagang

Undergraduate students from University of the Philippines Los Banos; under Summer Immersion Program; Duration: June 14 to July 26, 2018;

NIP contact person: Roland V. Sarmago

Joseph Kyle A. Obligacion

Undergraduate students from University of Northern Philippines; under Summer Immersion Program; Duration: June to July 2018; NIP contact person: Roland V. Sarmago

Cherry Joy Turqueza  
 Angelica Baral

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

Julius Kenneth E. Mahinay III (PSHS-CRC)  
 Jamela Verna L. Beniga (PSHS-CRC)  
 Jeonel L. Cabansay (PSHS-SRC)  
 Barly A. Dinalo (PSHS-CVisC)  
 Christian Dave T. Navesis (PSHS-CVisC)  
 Kimberly Shayne S. Tukasim (PSHS-WVC)

#### D. Main Challenges and Proposed Solutions

Main Challenges Encounter	Proposed Solutions
Some of the main characterization tools (SEM, XRD) have been requiring maintenance. We are tapping labs outside NIP for characterization	Allot funding for maintenance of lab equipment, find local technical support.

#### E. Positions of Responsibility Held

##### National (4)

Name of NIP Personnel	National Award or Accreditation, Positions of Responsibility Held	Award-giving body/ Organization
Arnel A. Salvador, Ph. D.	Academician	National Academy of Science and Technology
Elmer S. Estacio, Ph. D.	Coordinator, Material Science and Engineering Program	UP College of Science
Armando S. Somintac, Ph. D.	President	Samahang Pisika ng Pilipinas
	Director, Project Management and Resource Generation Office	UP Office of the Vice Chancellor for Research and Development

### III. Photos, ISI/SCI publications



CMPL-Semicon participants during the 36th Samahang Pisika ng Pilipinas Physics Conference held at Citystates Asturias Hotel, Puerto Princesa City, Philippines (June 8, 2018)



CMPL-Semicon member Jeremias Armonia (right) performs hands-on experiment with the participants of the workshop on Raman microscopy and spectroscopy held at NIP. (May 12, 2018)



CMPL-Supercon members welcomes its immersionists both high school and college students by having small get together at the National Institute of Physics.  
(June 23, 2018)



College interns lead the closing ceremony for the High school interns of CMPL-Supercon at National Institute of Physics.  
(July 3, 2018)





CMPL-Supercon's Kloudene Salazar and Dr. Roland Sarmago being toured by Dr. Nobuhiko Sarukura of Osaka University around their Laboratory in Japan.  
(July 26, 2018)



CMPL-Supercon members and colleagues at the 36<sup>th</sup> Samahang Pisika ng Pilipinas Physics Conference held at Citystates Asturias Hotel, Puerto Princesa City, Philippines  
(June 8, 2018)

## ISI/SCI Publications:

### Attachment 1:

Sadia, C. P., Lopez, L. P., delos Santos, R. M., Muldera, J. E., De Los Reyes, A. E., Tumanguil, M. A. C., Que, C. T., Mag-usara, V. K., Tani, M., Somintac, A. S., Estacio, E. S., & Salvador, A. A. (2018). Epitaxial growth of p-InAs on GaSb with intense terahertz emission under 1.55- $\mu\text{m}$  femtosecond laser excitation. *Thin Solid Films*, 648, 46–49. <https://doi.org/10.1016/j.tsf.2017.12.022>

### Attachment 2:

Balagos, M. H., Jaculbia, R., Prieto, E. A., Mag-usara, V. K., Tani, M., Salvador, A., Estacio, E., & Somintac, A. (2018). Surface effect of n-GaAs cap on the THz emission in LT-GaAs. *Journal of Materials Science: Materials in Electronics*, 29(14), 12436–12442. <https://doi.org/10.1007/s10854-018-9360-1>

### Attachment 3:

Prieto, E. A. P., Vizcara, S. A. B., Lopez, L. P., Vasquez, J. D. E., Balagos, M. H. M., Hashizume, D., Hayazawa, N., Kim, Y., Tani, M., Somintac, A. S., Salvador, A. A., & Estacio, E. S. (2018). Intense THz emission in high quality MBE-grown GaAs film with a thin n-doped buffer. *Optical Materials Express*, 8(6), 1463. <https://doi.org/10.1364/OME.8.001463>

### Attachment 4:

Kitahara, H., Yasumoto, T., Goto, D., Kato, H., Shiihara, M., Afalla, J., Mag-Usara, V., Yamamoto, K., Furuya, T., Tani, M., Estacio, E., & Bakunov, M. (2018). Sensitivity Improvement of Heterodyne Electro-Optic Sampling. In 2018 43rd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) (Vol. 2018–Septe, pp. 1–2). IEEE. <https://doi.org/10.1109/IRMMW-THz.2018.8510337>

### Attachment 5:

De Los Reyes, A. E., Vasquez, J. D. E., Lopez, L. P., Bardolaza, H. R., Chang, C.-Y., Jang, D.-J., Somintac, A. S., Salvador, A. A., & Estacio, E. S. (2018). Photoluminescence and terahertz time-domain spectroscopy of MBE-grown single-layered InAs/GaAs quantum dots. In International Conference on Infrared, Millimeter, and Terahertz Waves, IRMMW-THz (Vol. 2018–Septe). <https://doi.org/10.1109/IRMMW-THz.2018.8510014>

### Attachment 6:

delos Santos, R., Mag-usara, V., Tuico, A., Copa, V., Salvador, A., Yamamoto, K., Somintac, A., Kurihara, K., Kitahara, H., Tani, M., & Estacio, E. (2018). Metal-Coated <100>-Cut GaAs Coupled to Tapered Parallel-Plate Waveguide for Cherenkov-Phase-Matched Terahertz Detection: Influence of Crystal Thickness. *Journal of Infrared, Millimeter, and Terahertz Waves*, 39(6), 514–520. <https://doi.org/10.1007/s10762-018-0487-1>

### Attachment 7:

Kato, H., Kitahara, H., Goto, D., Yasumoto, T., Shihara, M., Afalla, J., Mag-Usara, V., Bulgarevich, D., Escafio, C., Yamamoto, K., Furuya, T., Bakunov, M., Estacio, E., & Tani, M. (2018). Enhancement of THz EO Sampling Signal by Polarization Filtering. In International Conference on Infrared, Millimeter, and Terahertz Waves, IRMMW-THz (Vol. 2018–Septe). <https://doi.org/10.1109/IRMMW-THz.2018.8510458>

Attachment 8:

Jose, A., Montecillo, A., Lopez, J., De Los Rcyes, A., Bacaoco, M., Faustino, M. A., Cafe, A., Vasquez, J. D., Gonzales, K. C., Catindig, G. A., Somintac, A., Salvador, A., & Estacio, E. (2018). Terahertz Emission Enhancement of i-/n-Gallium Arsenide Thin Film on a Porous Silicon Distributed Bragg Reflector designed at 800nm. In International Conference on Infrared, Millimeter, and Terahertz Waves, IRMMW-THz (Vol. 2018–Septe). <https://doi.org/10.1109/IRMMW-THz.2018.8510519>

Attachment 9:

Afalla, J., Gonzales, K. C., Muldera, J., Prieto, E. A., Catindig, G., Vasquez, J. D., Husay, H. A., Moriyasu, T., Kitahara, H., Bulgarevich, D., Mag-Usara, V., Furuya, T., Somintac, A., Salvador, A., Estacio, E., & Tani, M. (2018). Photo-carrier dynamics of MBE-grown GaAs on Silicon studied by optical-pump terahertz-probe. In 2018 43rd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) (Vol. 2018–Septe, pp. 1–2). IEEE. <https://doi.org/10.1109/IRMMW-THz.2018.8510368>

Attachment 10:

Angub, M. C. M., Vergara, C. J. T., Husay, H. A. F., Salvador, A. A., Empizo, M. J. F., Kawano, K., Minami, Y., Shimizu, T., Sarukura, N., & Somintac, A. S. (2018). Hydrothermal growth of vertically aligned ZnO nanorods as potential scintillator materials for radiation detectors. *Journal of Luminescence*, 203, 427–435. <https://doi.org/10.1016/j.jlumin.2018.05.062>

Attachment 11:

De Vero, J.C., Lee, D., Shin, H., Namuco, S.B., Hwang, I., Sarmago, R.V., Song, J.H. (2018). Influence of deposition conditions on the growth of micron-thick highly c-axis textured superconducting GdBa<sub>2</sub>Cu<sub>3</sub>O<sub>7- $\delta$</sub>  films on SrTiO<sub>3</sub> (100). *Journal of Vacuum Science & Technology A Vacuum Surfaces and Films* 36(3):031506. <https://doi.org/10.1116/1.5019393>

Attachment 12:

Agulto, V.C., Empizo, M.J., Kawano, K., Minami, Y., Yamanoi, K., Sarukura, N., Yago, A.C., Sarmago, R.V. (2018). Two-step Fabrication of ZnO-PVP Composites with tunable visible emissions. *Journal of Optical Materials*, 76, 317-322. <https://doi.org/10.1016/j.optmat.2017.12.048>

Attachment 13:

Bardolaza, H.R., Vasquez, J.D., Bacaoco, M.Y., de los Reyes, A.E., Lopez Jr., L.P., Somintac, A.S., Salvador, A.A., Estacio, E.S., Sarmago, R.V. (2018). Temperature dependence of THz emission and junction electric field of GaAs–AlGaAs modulation-doped heterostructures with different i-AlGaAs spacer layer thicknesses. *Journal of Materials Science: Materials in Electronics* 29, 8760–8766. <https://doi.org/10.1007/s10854-018-8892-8>

Attachment 14:

Agulto, V.C., Empizo, M.J.F., Kawano, K., Salazar, K.A., Minami, Y., Yamanoi, K., Shimizu, T., Yago, A.C., Sarmago, R.V., Sarukura N. (2018). Combination of post-growth treatments and their effects on ZnO microrods as potential UV phosphors. *Elsevier Journal of Optical Materials*, 86, 12-17. <https://doi.org/10.1016/j.optmat.2018.09.018>

Attachment 15:

Gonzales, K., Omambac, K., Prieto, E., Afalla, J., Balgos, M., Jaculbia, R., Somintac, A., Salvador, A., & Estacio, E. (2018). Terahertz Emission of Gallium Arsenide on Textured p-type Silicon (100) Substrates Grown via Molecular Beam Epitaxy. *Journal of Physics and Its Applications*, 1(1), 7-9. doi:<http://dx.doi.org/10.14710/jpa.v1i1.3908>

Attachment 16:

Ballesteros, L. I., Vergar, C. J., & Somintac, A. (2018). Fluorine-doped SnO<sub>2</sub> thin film as chemiresistive gas sensor for room temperature monitoring of fish freshness. *PISIKA - Journal of the Physics Society of the Philippines*, 1(1).  
<https://doi.org/10.20526/pisika.01a18.10>