

Ahmad Ridwan Tresna Nugraha



Researcher at Research Center for Physics
Indonesian Institute of Sciences (LIPI)
Gedung 442 Kawasan Puspiptek Serpong
Tangerang Selatan 15314, Indonesia

Phone : +62-21-756-0556
Fax : +62-21-756-0554
Email : ahmad.ridwan.tresna.nugraha@lipi.go.id
Homepage : <https://art.nugraha.web.id>

Brief Personal Information

Nationality: Indonesian. **Status:** Married. **Place/Date of Birth:** Bandung (Indonesia)/September 20, 1987.
Languages: English (fluent), Indonesian (native), Sundanese (native), Japanese (intermediate), and Classical Arabic (intermediate).

Higher Education

Doctor of Science (D.Sc.), Department of Physics, Graduate School of Science, Tohoku University, Japan (2013). Funded by Japanese Government through the Monbukagakusho Scholarship (Oct. 2010–Mar. 2013) and the JSPS Fellowship (Apr. 2013–Sep. 2013). Approved equivalent to Doktor (**Dr.**) degree in Indonesia by Ministry of Research, Technology and Higher Education of Indonesia in Dec. 2017. Dissertation title: “Coherent phonon spectroscopy of carbon nanotubes and graphene”

Master of Science (M.Sc.), Department of Physics Graduate School of Science, Tohoku University, Japan (2010). Funded by Japanese Government through the Monbukagakusho Scholarship. Thesis title: “Exciton environmental effect of single wall carbon nanotubes”

Sarjana Sains (S.Si., Department of Physics, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Indonesia (2008). Final project: “An alternative calculation method for electronic structure of graphene and carbon nanotubes using Hamiltonian matrix with expansion of basis functions”

Work Experience

Researcher, Research Center for Physics, Indonesian Institute of Sciences (LIPI), Indonesia (2019–present).

Assistant Professor, Department of Physics, Graduate School of Science, Tohoku University, Japan (2014–2019). Contracted under the Interdepartmental Doctoral Degree Program for Multi-dimensional Materials Science Leaders and Leading Graduate School Program of Tohoku University.

JSPS Postdoctoral Fellow at Theoretical Condensed Matter and Statistical Physics Group, Department of Physics, Graduate School of Science, Tohoku University, Japan (2013–2014). Supervisor: Professor Riichiro Saito.

Research Topics

My research interest are in the areas of condensed matter physics and quantum optics. In particular, I focus on **theory and simulation of physical properties of nanocarbons and low-dimensional materials**. Some subjects of my publications are as follows:

1. **electromechanics and optomechanics**, especially on understanding charge-induced electromechanical actuators and light-induced mechanical vibrations (phonons) in carbon-based materials,
2. **thermoelectric properties of low-dimensional materials** such as carbon nanotubes, quantum wires, quantum wells, and two-dimensional materials,
3. **theory of spectroscopy**, especially on Raman spectroscopy and ultrafast spectroscopy.

Within these research topics, I have published **42 papers** in reputable **international journals**, **3 papers** in **conference proceedings**, and **1 book chapter**. Most of my papers are published in **high-impact journals**, such as Applied Physics Letters, Physical Review B, Physical Review Letters, Carbon, Nano Letters, and Nano Energy. As of September 29, 2020, total citations according to [Google Scholar](#) (or [Scopus](#)) are 1013 (or 763) times with h-index = 15 (or 14).

Publications

○ = either as the first author or equal contributor or corresponding author

Papers in International Journals

42. C. Euaruksakul, H. Nakajima, A. Rattanachata, M. Y. Hanna, **A. R. T. Nugraha**, M. Boutchich: "Electronic and Thermoelectric Properties of Graphene on 4H-SiC (0001) Nanofacets Functionalized with F4-TCNQ", *Journal of Electronic Materials* (2020), in press.
41. N. T. Hung, **A. R. T. Nugraha**, T. Yang, R. Saito: "Confinement Effect in Thermoelectric Properties of Two-dimensional Materials", *MRS Advances* **5**, 469-479 (2020).
40. M. Nurhuda, **A. R. T. Nugraha**, M. Y. Hanna, E. Suprayoga, E. H. Hasdeo: "Thermoelectric properties of Mexican-hat band structures", *Advances in Natural Sciences: Nanoscience and Nanotechnology* **11**, 015012 (2020).
39. K. Zhang, X. Pang, T. Wang, F. Han, S.-L. Shang, N. T. Hung, **A. R. T. Nugraha**, Z.-K. Liu, M. Li, R. Saito, S. Huang: "Anomalous Phonon-mode Dependence in Polarized Raman Spectroscopy of Topological Weyl Semimetal TaP", *Physical Review B* **101**, 014308 (2020).
38. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Thermoelectric properties of carbon nanotubes", *Energies* **12**, 4561 (2019).
dx.doi.org/10.3390/en12234561
37. E. H. Hasdeo, L. P. A. Krisna, M. Y. Hanna, B. E. Gunara, N. T. Hung, ○ **A. R. T. Nugraha**: "Optimal band gap for improved thermoelectric performance of two-dimensional Dirac materials", *J. Appl. Phys.* **126**, 035109 (2019).
36. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Designing high-performance thermoelectrics in two-dimensional tetradymites", *Nano Energy* **58**, 743-749 (2019).
35. D. Satco, ○ **A. R. T. Nugraha**, M. S. Ukhtary, D. Kopylova, A. G. Nasibulin, R. Saito: "Intersubband plasmon excitations in doped carbon nanotubes", *Physical Review B* **99**, 075403 (2019).
34. N. T. Hung, **A. R. T. Nugraha**, T. Yang, Z. Zhang, R. Saito: "Thermoelectric performance of monolayer InSe improved by convergence of multivalley bands", *J. Appl. Phys.* **125**, 082502 (2019).
33. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Universal Curve of Optimum Thermoelectric Figures of Merit for Bulk and Low-dimensional Semiconductors", *Phys. Rev. Applied* **9**, 024019 (2018).
32. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Two-dimensional MoS₂ electromechanical actuators", *J. Phys. D* **51**, 075306 (2018).
31. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Three-dimensional carbon Archimedean lattices for high-performance electromechanical actuators", *Carbon* **125**, 472-479 (2017).
30. M. S. Ukhtary, **A. R. T. Nugraha**, R. Saito: "Negative refraction in Weyl semimetals", *J. Phys. Soc. Jpn.* **86**, 104703 (2017).
29. N. T. Hung, ○ **A. R. T. Nugraha**, R. Saito: "Two-dimensional InSe as a potential thermoelectric material", *Appl. Phys. Lett.* **111**, 092107 (2017).

28. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Charge-induced electrochemical actuation of armchair carbon nanotube bundles", *Carbon* **118**, 278-284 (2017).
27. Y. Harada, M. S. Ukhtary, M. Wang, S. K. Srinivasan, E. H. Hasdeo, **A. R. T. Nugraha**, G. T. Noe II, Y. Sakai, R. Vajtai, P. M. Ajayan, R. Saito, J. Kono: "Giant attenuation of terahertz waves by monolayer graphene in a total internal reflection geometry", *ACS Photonics* **4**, 121-126 (2017).
26. ○ **A. R. T. Nugraha**, E. H. Hasdeo, R. Saito: "Selective coherent phonon mode generation in single wall carbon nanotubes", *J. Phys. Condens. Matter* **29**, 055302 (2017).
25. P. Ayria, S. Tanaka, **A. R. T. Nugraha**, M. S. Dresselhaus, R. Saito: "Phonon-assisted indirect transitions in angle-resolved photoemission spectra of graphite and graphene", *Phys. Rev. B* **94**, 075429 (2016).
24. M. S. Ukhtary, **A. R. T. Nugraha**, E. H. Hasdeo, R. Saito: "Broadband transverse electric surface wave in silicene", *Appl. Phys. Lett.* **109**, 063103 (2016).
23. E. H. Hasdeo, **A. R. T. Nugraha**, M. S. Dresselhaus, R. Saito: "Fermi energy dependence of first- and second-order Raman spectra in graphene: Kohn anomaly and quantum interference effect", *Phys. Rev. B* **94**, 075104 (2016).
22. N. T. Hung, E. H. Hasdeo, **A. R. T. Nugraha**, M. S. Dresselhaus, R. Saito: "Quantum effects in the thermoelectric power factor of low dimensional semiconductors", *Phys. Rev. Lett.* **117**, 036602 (2016). ★ **Note:** This paper is highlighted by Phys.org website (August 2016), "[Theory of thermoelectric properties updated after 23 years](#)".
21. X. Ling, S. Huang, E. H. Hasdeo, L. Liang, W. M. Parkin, Y. Tatsumi, **A. R. T. Nugraha**, A. A. Puretzky, P. M. Das, B. G. Sumpter, D. B. Geohegan, J. Kong, R. Saito, M. Drndic, V. Meunier, M. S. Dresselhaus: "Anisotropic Electron-Photon and Electron-Phonon Interactions in Black Phosphorus", *Nano Lett.* **16**, 2260-2267 (2016).
20. P. Ayria, **A. R. T. Nugraha**, E. H. Hasdeo, T. R. Czank, S. Tanaka, R. Saito: "Photon energy dependence of angle-resolved photoemission spectroscopy in graphene", *Phys. Rev. B* **92**, 195148 (2015).
19. N. T. Hung, ○ **A. R. T. Nugraha**, E. H. Hasdeo, M. S. Dresselhaus, R. Saito: "Diameter dependence of thermoelectric power of semiconducting carbon nanotubes", *Phys. Rev. B* **92**, 165426 (2015). ★ **Note:** This paper is highlighted in News and Views section of Nature Energy (2016), "[Thermoelectrics: Carbon nanotubes get high](#)".
18. R. Saito, **A. R. T. Nugraha**, E. H. Hasdeo, S. Siregar, H. Guo, T. Yang: "Ultraviolet Raman spectroscopy of graphene and transition-metal dichalcogenides", *Phys. Status Solidi B* **252**, 2363-2374 (2015).
17. M. Shoufie Ukhtary, E. H. Hasdeo, **A. R. T. Nugraha**, R. Saito: "Fermi energy dependence of electromagnetic wave absorption in graphene", *Appl. Phys. Express* **8**, 055102 (2015).
16. ○ **A. R. T. Nugraha**, E. H. Hasdeo, G. D. Sanders, C. J. Stanton, R. Saito: "Origin of coherent G band phonon spectra in single wall carbon nanotubes", *Phys. Rev. B* **91**, 045406 (2015).
15. E. H. Hasdeo, **A. R. T. Nugraha**, R. Saito, M. S. Dresselhaus: "Breit-Wigner-Fano lineshapes in Raman spectra of graphene", *Phys. Rev. B* **90**, 245140 (2014).
14. Y.-S. Lim, **A. R. T. Nugraha**, S.-J. Cho, M.-Y. Noh, E.-J. Yoon, H. Liu, J.-H. Kim, H. Telg, E. H. Haroz, G. D. Sanders, S.-H. Baik, H. Kataura, S. K. Doorn, C. J. Stanton, R. Saito, J. Kono, T. Joo: "Ultrafast Generation of Fundamental and Multiple-order Phonon Excitations in Highly-Enriched (6,5) Single-Wall Carbon Nanotubes", *Nano Lett.* **14**, 1426-1432 (2014).
13. E. H. Hasdeo, **A. R. T. Nugraha**, K. Sato, R. Saito, M. S. Dresselhaus: "Electronic Raman scattering and the Fano resonance in metallic carbon nanotubes", *Phys. Rev. B* **88**, 115107 (2013).
12. ○ **A. R. T. Nugraha**, E. Rosenthal, E. H. Hasdeo, G. D. Sanders C. J. Stanton, M. S. Dresselhaus, R. Saito: "Excitonic effects on coherent phonon dynamics in single wall carbon nanotubes", *Phys. Rev. B* **88**, 075440 (2013). ★ **Note:** [Figure 2](#) of this paper is selected as one of the [PRB Kaleidoscope images for August 2013](#).

11. G. D. Sanders, ○ **A. R. T. Nugraha**, K. Sato, J.-H. Kim, J. Kono, C. J. Stanton, R. Saito: "Theory of coherent phonons in carbon nanotubes and graphene", *J. Phys. Condens. Matter* **25**, 144201 (2013), Invited Review Article.
10. J. H. Kim, **A. R. T. Nugraha**, L. G. Booshehri, E. H. Haroz, K. Sato, G. D. Sanders, K.-J. Yee, Y.-S. Lim, C.-J. Stanton, R. Saito, J. Kono: "Coherent phonons in carbon nanotubes and graphene", *Chem. Phys.* **413**, 55-80 (2013), Invited Special Issue.
9. G. D. Sanders, **A. R. T. Nugraha**, R. Saito, C. J. Stanton: "Coherent radial breathing like phonons in graphene nanoribbons", *Phys. Rev. B* **85**, 205401 (2012).
8. S. Cambre, S. Santos, W. Wenseleers, **A. R. T. Nugraha**, R. Saito, L. Cognet, and B. Lounis: "Luminescence properties of individual empty and water-filled single-walled carbon nanotubes", *ACS Nano* **6**, 2649-2655 (2011).
7. ○ **A. R. T. Nugraha**, G. D. Sanders, K. Sato, C. J. Stanton, M. S. Dresselhaus, and R. Saito: "Chirality dependence of coherent phonon amplitudes in single wall carbon nanotubes", *Phys. Rev. B* **84**, 174302 (2011).
★ **Note:** Figure 6 of this paper is selected as one of the PRB Kaleidoscope images for November 2011.
6. M. M. Haque, L. C. Yin, ○ **A. R. T. Nugraha**, and R. Saito: "Vibrational and NMR properties of polyynes", *Carbon* **49**, 3340-3345 (2011).
5. ○ **A. R. T. Nugraha**, K. Sato, and R. Saito: "Confinement of excitons for the lowest optical transition energies of single wall carbon nanotubes", *e-J. Surf. Sci. Nanotech.* **8**, 367-371 (2010).
4. P. T. Araujo, **A. R. T. Nugraha**, K. Sato, M. S. Dresselhaus, R. Saito, A. Jorio: "Chirality dependence of the dielectric constant for the excitonic transition energy of single wall carbon nanotubes", *Phys. Status Solidi B* **247**, 2847-2850 (2010).
3. K. Sato, **A. R. T. Nugraha**, and R. Saito: "Excitonic effects on Raman intensity of single wall carbon nanotubes", *e-J. Surf. Sci. Nanotech.* **8**, 358-361 (2010).
2. ○ **A. R. T. Nugraha**, R. Saito, K. Sato, P. T. Araujo, A. Jorio, and M. S. Dresselhaus: "Dielectric constant model for environmental effects on the exciton energies of single wall carbon nanotubes", *Appl. Phys. Lett.* **97**, 091905 (2010).
1. K. Sato, R. Saito, **A. R. T. Nugraha**, and S. Maruyama: "Excitonic effects on radial breathing mode intensity of single wall carbon nanotubes", *Chem. Phys. Lett.* **497**, 94-98 (2010).

Papers in Conference Proceedings

3. ○ **A. R. T. Nugraha** and E. H. Hasdeo: "Coherent and squeezed phonons in single wall carbon nanotubes", *Journal of Physics: Conference Series* **1191**, 012002 (2019).
2. N. T. Hung, **A. R. T. Nugraha**, and R. Saito: "Size effect in thermoelectric power factor of nondegenerate and degenerate low-dimensional semiconductors", *Materials Today: Proceedings* **4**, 12368-12373 (2017).
1. G. D. Sanders, **A. R. T. Nugraha**, K. Sato, J.-H. Kim, Y.-S. Lim, J. Kono, R. Saito, and C. J. Stanton: "Coherent phonons in carbon based nanostructures", *Proceedings of SPIE* **9083**, 908309 (2014).

Book Chapter

1. R. Saito, **A. R. T. Nugraha**, E. H. Hasdeo, N. T. Hung, W. Izumida: "Electronic and optical properties of single wall carbon nanotubes", in *Single-Walled Carbon Nanotubes: Preparation, Property and Application*, edited by Y. Li and S. Maruyama, Springer, *Topics in Current Chemistry* **375**, 1-24 (2017).

Awards, Grants, and Scholarships

LIPI Young Scientist Award (2019).

Outstanding Reviewer for “Carbon” (2017). Carbon is a high-impact journal with impact factor currently 7.466.

The Japan Society of Applied Physics (JSAP) Outstanding Paper Award in 2017 for a paper entitled “*Fermi energy-dependence of electromagnetic wave absorption in graphene*”, published in Appl. Phys. Express 8, 055102 (2015), written by M. S. Ukhtary, E. H. Hasdeo, A. R. T. Nugraha, and R. Saito.

The Japan Society for Promotion of Science (JSPS) Fellowship for Young Scientists (DC2 to PD scheme), April 2013 - September 2014.

Tohoku University Global Center of Excellence Grant for Students, December 2010 - March 2012.

The MEXT (Japanese Government) Scholarship for Master and Doctor Courses in Tohoku University, Japan, October 2008 - March 2013.

The 2nd Most Outstanding Undergraduate Student (Peringkat II Mahasiswa Berprestasi Utama) at Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung (2007).

The Most Outstanding Undergraduate Student (Mahasiswa Berprestasi Utama) at Department of Physics, Institut Teknologi Bandung (2007).

TPB Prize (Outstanding First-Year Student), Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung (ITB), Indonesia, August 2005, for obtaining a perfect GPA (4.0/4.0) from 36 course credits in the first year at ITB.

Teaching and Supervision

Supervisor of Assa Eka Oktaviani (August 2019 - June 2020), Undergraduate Student, Department of Physics, State University of Malang, Indonesia. Final project: “Optimization of on/off ratio with Klein tunneling in bilayer graphene as a transistor material”

Mentor of Nguyen Tuan Hung (October 2014 - March 2019), Doctoral Student, Department of Physics, Tohoku University. We published some papers in Physical Review B, Physical Review Letters, and Carbon.

Graduate tutor for Eddwi Hesky Hasdeo (October 2011 - September 2013), Master Student, Department of Physics, Tohoku University. During that period we co-authored several papers.

Teaching assistant for Physics B course (October 2010 - February 2011), Department of Physics, Tohoku University. Instructor: Prof. Riichiro Saito.

Assistant Coordinator at Elementary Physics Laboratory / Laboratorium Fisika Dasar (August 2007 - June 2008), Institut Teknologi Bandung. Supervisor: Dr. Euis Sustini.

Teaching assistant for Solid State Physics course (January - June 2008), Department of Physics, Institut Teknologi Bandung. Instructor: Prof. Sukirno.

Teaching assistant for Elementary Physics courses (in academic years 2006/2007 and 2007/2008), Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung. Instructors: Prof. Sukirno and Prof. Mitra Djamal.

Technical Skills

Windows and Linux (advanced). I am experienced with all versions of Windows and also with several distributions of Linux-based operating systems, such as CentOS/RedHat, Ubuntu/Debian, and Slackware.

Computer networking and administration (*advanced*). During graduate course (2008-2013), I was involved in constructing and maintaining several clusters and workstations for computational purpose. From April 2014 until September 2019, I have been trusted as the main administrator of 2 lab servers in Tohoku University: <http://flex.phys.tohoku.ac.jp> and <http://www.cmpt.phys.tohoku.ac.jp>

Programming languages: Fortran (*advanced*), **Python** (*intermediate*), and **C/C++** (*basic*). I use Fortran and Python mostly for my research and C/C++ occasionally for fun.

Markup languages: \LaTeX (*advanced*), **CSS/HTML** (*intermediate*). I have already been familiar with \LaTeX since my undergraduate course, especially for writing research notes, papers, and theses. I am also interested in the website development and have been an experienced **WordPress** user for more than 10 years. See for example: <http://majalah1000guru.net>

Miscellaneous

- (1) I contributed a short paragraph in IGPAS (International Graduate Program for Advanced Sciences) Booklet 2011, Tohoku University. I shared my experience as an international student in Japan. The booklet can be downloaded from the following link: <http://www.sci.tohoku.ac.jp/docs/world-wide/igpas2011.pdf>
- (2) Together with Professor Riichiro Saito, we promoted IGPAS of Tohoku University to students in Institut Teknologi Bandung and University of Indonesia (8-11 February 2011).
- (3) After the 2011 Great Earthquake and Tsunami in Tohoku area, I was involved in some voluntary activities affiliated with the Indonesian Students Association in Japan (Persatuan Pelajar Indonesia di Jepang). We went to several towns for cleaning debris and served tsunami refugees with Indonesian foods.
- (4) In May 2011 - May 2012, I was appointed as a chairman of the Miyagi Branch of Indonesian Students Association in Japan (Persatuan Pelajar Indonesia di Jepang, Komisariat Miyagi). In September 2012 - September 2013, I also became one of three chairmen in the central board of Indonesian Student Association in Japan (Persatuan Pelajar Indonesia di Jepang).
- (5) My hobbies include various types of sports such as table tennis, futsal/soccer, and pencak silat (Indonesian traditional martial arts). I practice these sports regularly with friends and sometimes we participate in amateur-level tournaments or festivals.