

# Ahmad Ridwan Tresna Nugraha



Assistant Professor  
Department of Physics, Tohoku University  
Science Complex B, Room 946  
6-3 Aramaki-Aza-Aoba, Aoba-ku,  
Sendai, 980-8578, Japan

Phone : +81-22-795-6442  
Fax : +81-22-795-6447  
Email : [nugraha@flex.phys.tohoku.ac.jp](mailto:nugraha@flex.phys.tohoku.ac.jp)  
Homepage : <http://flex.phys.tohoku.ac.jp/~nugraha>

## 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

- D.Sc. in Physics, Tohoku University, Japan (October 2010 - September 2013).
- M.Sc. in Physics, Tohoku University, Japan (October 2008 - September 2010).
- B.Sc. in Physics, Institut Teknologi Bandung, Indonesia, (August 2004 - July 2008).

## Work Experiences

**Researcher**, Research Center for Physics, Indonesian Institute of Sciences, Indonesia (accepted in February 2019). Considered on leave until September 2019.

**Assistant Professor**, Department of Physics, Graduate School of Science, Tohoku University, Japan (October 2014 - September 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 (October 2013 - September 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:

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

Within these research topics, 36 research papers have been published in international journals. Total citations according to [Google Scholar](#) (as of March 14th, 2018) is 656 times with h-index = 13.

## 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 daily research life and C/C++ occasionally for fun.

**Markup languages: L<sup>A</sup>T<sub>E</sub>X (advanced), CSS/HTML (intermediate).** I have already been familiar with L<sup>A</sup>T<sub>E</sub>X 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 almost 10 years. See for example: <http://majalah1000guru.net>

## Published Papers

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

1. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Universal Curve of Optimum Thermoelectric Figures of Merit for Bulk and Low-dimensional Semiconductors", *Nano Energy* **58**, 743-749 (2019).
2. 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).
3. 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).
4. 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).
5. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Two-dimensional MoS<sub>2</sub> electromechanical actuators", *J. Phys. D* **51**, 075306 (2018).
6. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Three-dimensional carbon Archimedean lattices for high-performance electromechanical actuators", *Carbon* **125**, 472-479 (2017).
7. M. S. Ukhtary, **A. R. T. Nugraha**, R. Saito: "Negative refraction in Weyl semimetals", *J. Phys. Soc. Jpn.* **86**, 104703 (2017).
8. N. T. Hung, ○ **A. R. T. Nugraha**, R. Saito: "Two-dimensional InSe as a potential thermoelectric material", *Appl. Phys. Lett.* **111**, 092107 (2017).
9. N. T. Hung, **A. R. T. Nugraha**, R. Saito: "Charge-induced electrochemical actuation of armchair carbon nanotube bundles", *Carbon* **118**, 278-284 (2017).
10. 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).
11. ○ **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).
12. 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).
13. 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).

14. 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).
15. 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](#)".
16. 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).
17. 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).
18. 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](#)".
19. 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).
20. 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).
21. ○ **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).
22. 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).
23. 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).
24. 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).
25. ○ **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](#).
26. 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.
27. 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.
28. 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).
29. S. Cambre, S. Santos, W. Wenseleers, **A. R. T. Nugraha**, R. Saito, L. Cagnet, and B. Lounis: "Luminescence properties of individual empty and water-filled single-walled carbon nanotubes", *ACS Nano* **6**, 2649-2655 (2011).

30. ○ **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](#).
31. M. M. Haque, L. C. Yin, ○ **A. R. T. Nugraha**, and R. Saito: “Vibrational and NMR properties of polyynes”, *Carbon* **49**, 3340-3345 (2011).
32. ○ **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).
33. 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).
34. 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).
35. ○ **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).
36. 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).

## Scholarships, Grants, and Awards

JSPS Fellowship for Young Scientists (DC2 to PD scheme), April 2013 - September 2014.

Tohoku University Global COE Research Grant for Students, December 2010 - March 2012.

MEXT Scholarship for Master and Doctor Courses in Tohoku University, Japan, October 2008 - March 2013.

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

## Teaching and Tutor Experiences

**Mentor** of Nguyen Tuan Hung (October 2014 - present), 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.

## 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.