

# Dong Yoon Shin

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## EDUCATION

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### UNIVERSITY OF TOKYO

**Master of Science**, Department of Physics, Graduate School of Science. GPA 4.00/4.00

Tokyo, Japan

March 2014

### YOKOHAMA NATIONAL UNIVERSITY

**Bachelor of Engineering**, Division of Physics, Faculty of Engineering. GPA 3.73/4.50

Yokohama, Japan

March 2012

## RESEARCH EXPERIENCE

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### INSTITUTE FOR ADVANCED ENGINEERING (IAE)

Yongin, South Korea

**Senior Researcher**, Materials Science & Chemical Engineering Center

April 2014 – July 2019

- Worked as a Technical Research Personnel, alternative to national military service (April 2014 – April 2017)
- Designed and performed research in the fields of applied physics and chemistry, materials science, and environmental engineering
- Researched semiconductor-based photocatalysts to enhance photocatalysis under visible light by surface modification, combination with other semiconductors, and coupling with metal ions
- Synthesized, characterized, and applied metal and semiconductor nanoparticles, quantum dots, and oxide dispersion-strengthened alloys
- Developed up-cycling methods for wastes from LCD, LED, NiMH batteries, smart glass, and slag
- Improved purification process for  $\text{TiCl}_4$  and heavy rare earth elements (Tm, Yb, and Er)
- Designed, fabricated, and applied a radio-frequency thermal plasma system to synthesize high-purity nanoparticles

### UNIVERSITY OF TOKYO

Tokyo, Japan

**Graduate Student**, Hasegawa Research Group (Surface Science)

April 2012 – March 2014

- Studied atomic structures, electronic states, and electronic transport at surface states by controlling surface superstructures in ultrahigh vacuum using electron diffraction, scanning tunneling microscopy, photoemission spectroscopy, and four-point probes
- Researched the interactions between the surface two-dimensional electron states and magnetic adatoms in dilute magnetic surface systems by conducting surface-sensitive and temperature-dependent resistivity measurements to examine the two-dimensional Kondo effect and RKKY interactions
- Supported research by the Hasegawa Research Group, including on the Rashba effect, weak anti-localization, two-dimensional superconductors, topological insulators, and silicene

### YOKOHAMA NATIONAL UNIVERSITY

Yokohama, Japan

**Undergraduate Student**, Kaoru Ohno Lab (First-Principles Calculation)

April 2011 – March 2012

- Studied fundamentals of *ab-initio* calculations and the all-electron mixed-basis approach to condensed matter physics
- Participated in a project for developing the Tohoku Mixed-Basis Orbitals *ab-initio* program (TOMBO), an advanced all-electron mixed-basis *ab-initio* code for density functional theory (DFT)-based calculations

## SELECTED JOURNAL ARTICLES (9 of 13)

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“Combining surface-fluorinated  $\text{TiO}_2$  hollow spheres and  $\text{WO}_3$  nanoparticles for highly efficient photocatalysis under visible light,” **Dongyoon Shin**, Duk-Hee Lee, Chan-Gi Lee, Kyung-Soo Park, Submitted.

“Facile synthesis of single-phase alpha-tungsten nanopowders from ammonium paratungstate by RF induction thermal plasma and thermochemicals,” **Dongyoon Shin**, Hyun-Woo Shim, Basudev Swain, Kyung-Soo Park, Chan-Gi Lee, Korean Journal of Metals and Materials, Vol. 58 (2020) 798-807.

## SELECTED JOURNAL ARTICLES (9 of 13) (continued)

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- “Comparison of different tungsten precursors for preparation of tungsten nanopowder by RF induction thermal plasma,” **Dongyoon Shin**, Basudev Swain, Chulwoong Han, Yonghwan Kim, Chan-Gi Lee, Kyung-Soo Park, International Journal of Refractory Metals and Hard Materials, Vol. 86 (2020) 104995.
- “One-pot wet chemical synthesis of fluorine-containing TiO<sub>2</sub> nanoparticles with enhanced photocatalytic activity,” Duk-Hee Lee, Basudev Swain, **Dongyoon Shin**, Nak-Kyoon Ahn, Jae-Ryang Park, Kyung-Soo Park, Materials Research Bulletin, Vol. 109 (2019) 227-232.
- “Synthesis of submicron silver powder from scrap low-temperature co-fired ceramic e-waste: Understanding the leaching kinetics and wet chemistry,” Basudev Swain, **Dongyoon Shin**, So Yeong Joo, Nak Kyoon Ahn, Chan-Gi Lee, Jin-Ho Yoon, Chemosphere, Vol. 194 (2018) 793-802.
- “Selective recovery of silver from waste low-temperature co-fired ceramic and valorization through silver nanoparticles,” Basudev Swain, **Dongyoon Shin**, So Yeong Joo, Nak Kyoon Ahn, Chan-Gi Lee, Jin-Ho Yoon, Waste Management, Vol. 69 (2017) 79-87.
- “Development of high-strength glass-ceramic materials by utilization of slag discharged from the steel-making industry in Korea,” **Dongyoon Shin**, Duk-Hee Lee, Mijung Yoon, Hyun Seo Park, Sung Mo Seo, Jin-Ho Yoon, Science of Advanced Materials, Vol. 8 (2016) 2295-2298.
- “Recycling of waste automotive laminated glass and valorization of polyvinyl butyral through mechanochemical separation,” Basudev Swain, Jae Ryang Park, **Dong Yoon Shin**, Kyung-Soo Park, Myung Hwan Hong, Chan-Gi Lee, Environmental Research, Vol. 142 (2015) 615-623.
- “*In situ* magnetotransport measurements in ultrathin bi films: Evidence for surface-bulk coherent transport,” Masaki Aitani, Toru Hirahara, Satoru Ichinokura, Masahiro Hanaduka, **Dongyoon Shin**, and Shuji Hasegawa, Physical Review Letters, Vol. 113 (2014) 206802.

## SELECTED RESEARCH PROJECTS at IAE (7 of 21)

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- “Development of commercial system for detoxification/recycling of LCD/LED waste glass and automatic plant for disassembly/sorting of waste displays,” funded by Ministry of Environment, Republic of Korea (Project No. 2016002250005), 2016–2019.
- “Development of high purity TiO<sub>2</sub> manufacturing technology for white color paints application from ilmenite ore,” funded by Ministry of Trade, Industry, and Energy, Republic of Korea, (Project No. 20152510101950), 2015–2019.
- “Development of manufacturing techniques for high purity (3N5) tungsten powder from tungsten (more than 95%) wastes,” funded by Ministry of Trade, Industry, and Energy, Republic of Korea (Project No. 20165020301260), 2016–2018.
- “Development of technology for recovery of high purity silver and production of silver nanopowder from electrode by-products,” funded by Ministry of Trade, Industry, and Energy, Republic of Korea, (Project No. 20155020101140), 2015–2017.
- “Development of highly sensitive and functional organic/inorganic hybrid plastic composite for LED,” funded by Ministry of Trade, Industry, and Energy, Republic of Korea (Project No. R0004019), 2015–2017.
- “Continuous production technology of granular titanium metal,” funded by the Ministry of Trade, Industry, and Energy, Republic of Korea (Project No. 10063143), 2016–2018.
- “Development and commercialization of the recycling technologies, recovery efficiency above 95% and purity 99.999% of the Ga & In from the LED wastes,” funded by the Ministry of Trade, Industry, and Energy, Republic of Korea (Project No. 20135020100930), 2015–2016.

## PATENTS

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- “Method for manufacturing tungsten metal nanopowder of single alpha-tungsten phase,” [KR20200081723A](#), Priority 2018-12-28.
- “Method for manufacturing tungsten trioxide nanopowder using RF plasma,” [KR20200081724A](#), Priority 2018-12-28.
- “Method for recovering silver from by-products generated in the electrode manufacturing process,” [KR101951352B1](#), Granted 2019-02-22, Priority 2017-09-08.
- “Film-glass separating plant for recycling waste glass and treating method,” [KR101781132B1](#), Granted 2017-09-22, Priority 2016-03-17.
- “Shearing device of film-glass separating plant to separate film and glass for recycling waste glass,” [KR101758881B1](#), Granted 2017-07-14, Priority 2016-03-17.
- “Method for leaching gallium from LED scraps,” [KR20170009144A](#), Priority 2015-07-15.

## SELECTED INTERNATIONAL CONFERENCE PRESENTATIONS (11 of 15)

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- “A study on F-TiO<sub>2</sub>-WO<sub>3</sub> photocatalyst with enhanced visible light photocatalytic activity,” 5<sup>th</sup> International Conference on Electronic Materials and Nanotechnology for a Green Environment (ENGE), 2018.
- “Synthesis of flower-like Cu<sub>3</sub>(MoO<sub>4</sub>)<sub>2</sub>O microspheres by simple aqueous precipitation and its application for Li-ion batteries,” 5<sup>th</sup> International Conference on Electronic Materials and Nanotechnology for a Green Environment (ENGE), 2018.
- “A study on high purity tungsten nanoparticle preparation through RF induction thermal plasma and the hydrogen reduction process,” International Union of Materials Research Societies – International Conference on Electronic Materials (IUMRS–ICEM), 2018.
- “Synthesis and characterization of TiO<sub>2</sub> nanoparticles with different morphologies using AHFT as a starting material,” Fall Conference of Korean Powder Metallurgy Institute incorporating 2<sup>nd</sup> International Symposium on Innovation in Materials Processing (ISIMP), 2017.
- “Silver recovery as nanoparticles from LTCC by-products,” 4<sup>th</sup> International Conference on Electronic Materials and Nanotechnology for Green Environment (ENGE), 2016.
- “The preparation and property control of zinc oxide nanoparticles on non-aqueous medium,” 9<sup>th</sup> International Conference on Quantum Dots, 2016.
- “Synthesis of quantum dots using the continuous micro-reactor method,” 4<sup>th</sup> International Conference of Advances in Functional Materials (AFM), 2016.
- “Recovery of indium powders from indium chloride solutions by leaching, enrichment, and cementation,” 3<sup>rd</sup> 3R International Scientific Conference on Material Cycles and Waste Management (3RINC), 2016.
- “Size and shape control of metal nanoparticles in one-pot synthesis,” 20<sup>th</sup> International Vacuum Congress (IVC), 2016.
- “Study on high functional abrasive-resistant materials using slag for industrial application,” 14<sup>th</sup> International Union of Materials Research Societies – International Conference on Advanced Materials (IUMRS–ICAM), 2015.
- “Electrical conductivity of a dilute magnetic surface superstructure on Si(111),” 14<sup>th</sup> International Conference on the Formation of Semiconductor Interfaces (ICFSI), 2013.

## HONORS & AWARDS

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- **Monbukagakusho Honors Scholarship**, granted by Japan Student Services Organization (JASSO) 2012, 2013
- **Korea-Japan Joint Government Scholarship** for Students in Science and Engineering, granted by governments of Korea and Japan to qualified Korean students to study in Japan, five-year scholarship of full tuition and stipend 2007 – 2011
- **Best Presentation Award**, Fall Conference of Korean Powder Metallurgy Institute incorporating 2nd International Symposium on Innovation in Materials Processing (ISIMP) 2017
- **Best Poster Award**, International Union of Materials Research Societies – International Conference on Advanced Materials (IUMRS–ICAM) 2015

## TEACHING EXPERIENCE

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### UNIVERSITY OF TOKYO

Tokyo, Japan

#### Teaching Assistant (TA)

October 2012 – March 2013

- TA for “Experiments in Physics II – Electron Diffraction” given by Professor Shuji Hasegawa

#### Mentor for Graduation Research of Undergraduate Student in Physics

October 2012 – March 2013

- Guided an undergraduate student for his required research in the Hasegawa Research Group

### YOKOHAMA NATIONAL UNIVERSITY

Yokohama, Japan

#### Physics Tutor for Prospective International Students

October 2011 – March 2012

- Taught weekly physics class to six prospective international students

## VOLUNTEER ACTIVITIES

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- Tutor for international students in Division of Physics, Yokohama National University 2010 – 2011
- Service Civil International – South Korea (SCI–Korea), participated in volunteering projects 2009 – 2010
- International Student Center at Yokohama National University, supported international students 2008 – 2011

## LANGUAGE PROFICIENCY

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- Fluent in **English** and **Japanese**; Native in **Korean**
- TOEFL iBT: 103-105 (Reading: 30, Listening: 27, Speaking: 21-23, Writing: 25)

## QUALIFICATIONS

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- **Surface Science Engineer**, qualified by the Japan Society of Vacuum and Surface Science

## REFERENCES

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**Shuji Hasegawa**, Professor

Department of Physics, Graduate School of Science, University of Tokyo

+81-3-5841-4167, shuji@surface.phys.s.u-tokyo.ac.jp, <http://www-surface.phys.s.u-tokyo.ac.jp/>

**Kaoru Ohno**, Professor

Division of Intelligent Systems Engineering, Faculty of Engineering, Yokohama National University

+81-45-339-4254, ohno@ynu.ac.jp, <http://www.ohno.ynu.ac.jp/>

**Chan Gi Lee**, Principal Researcher

Director of Materials Science & Chemical Engineering Center, Institute for Advanced Engineering

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