



# Bo Hyung Ryoo

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## RESEARCH FOCUS

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Inorganic/Physical Chemistry, Solid-State Materials, Nanoscience, Semiconductor, Finite-Magnets, Experiment *and* Theory.

## EDUCATION

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**University of Pennsylvania, Department of Chemistry** Philadelphia, PA  
PhD Candidate in Inorganic and Materials Chemistry Aug. 2023 - present  
Research Advisor: Chris B. Murray GPA: 3.78

**University of Pittsburgh, Department of Chemistry** Pittsburgh, PA  
M.S. Inorganic Chemistry Apr. 2016 - Aug. 2019  
Research Advisor: Jill E. Millstone GPA: 3.85

“Influence of Phosphine and Halide Ligands on the Properties of Undecagold Nanoclusters”

**University of Pittsburgh, Department of Chemistry** Pittsburgh, PA  
Bachelor of Science in Chemistry Aug. 2012 - Apr. 2016  
Minor: Physics

## RESEARCH EXPERIENCE

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**SionTech Co. Ltd.** Daejeon, S. Korea  
*Senior Researcher · Technical Research Personnel* Sep. 2019 - Sep. 2022

- Designed and improved capacitative deionization (CDI) cells for commercial/industrial water purification
- Developed and tested new methods on large-scale chemical depolymerization of polyesters for plastic-recycling

**University of Pittsburgh** Pittsburgh, PA  
*Graduate Student Researcher under Prof. Jill E. Millstone* Apr. 2016 - Aug. 2019

- Synthesized and analyzed atomically precise gold nanoclusters and understand their physical properties with the use of density functional theory (DFT)

**University of Pittsburgh** Pittsburgh, PA  
*Undergraduate Student Researcher for Prof. Jill E. Millstone* Sept. 2013 - Apr. 2016

- Synthesized small gold nanoparticles (< 5nm) protected with various thiolated ligands and studied their properties using diverse analytical techniques

**Carnegie Mellon University** Pittsburgh, PA  
*Undergraduate Student Researcher for Prof. David Yaron* Apr. 2014 - Oct. 2014

- Modelled small metal-containing molecules with hotbit density functional tight binding theory (DFTB) calculation on atomic simulation environment (ASE) for faster and accurate geometry optimization

**Korean Advanced Institute of Science and Technology**

*High School Student Shadowing Under Prof. Yun-Ho Lee*

Daejeon, S. Korea

*May 2011 - Jul. 2011*

- Shadowed graduate students and learned about synthetic approaches on efficient inorganic catalysts for energy-related industrial applications

## PATENTS AND PUBLICATIONS

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8. Kim, M-Y.; Kang, K-S.; Lee, K-H.; Ryoo, B-H. (Siontech Co, Ltd). Capacitive Deionization Electrode and Manufacturing Method Thereof. *US. Patent* US20230113091A1, Apr. 13, 2023. *patent pending* [granted in KR]
7. Ryoo, B-H.; Lee, K-H.; Kang, K-S.; Kang, S-W.; Kim, Y-H.; Do, S-A. (Siontech Co, Ltd). Chemical Recycling Method of Polyester-based Polymer Waste. *KR. Patent* KR102571563B1, Aug. 29, 2023.
6. Kang, K-S.; Lee, K-H.; Do, S-A.; Kang, S-W.; Ryoo, B-H. (Siontech Co, Ltd). Recovery Method for Bis-hydroxyethyl Terephthalate from Polyethylene Terephthalate. *KR. Patent* KR102604653B1, Nov. 23, 2023.
5. Kang, K-S.; Lee, K-H.; Lee, H-I.; Ryoo, B-H.; Park, N-S.; Lee, K-H. (Siontech Co, Ltd). Energy-saving Ion Adsorption/Desorption Water Purification Apparatus and Energy-saving Water Purification Method. *US. Patent* US11820680B2, Nov. 21, 2023.
4. Lee, K-H.; Ryoo, B-H.; Do, S-A.; Kang, K-S. (Siontech Co, Ltd). Capacitive Desalination Cell Performance Inspection Device. *KR. Patent* KR1020220067738, Nov. 1, 2022.
3. Kang, K-S.; Lee, K-H.; Park, N-S.; Yoo, H-W.; Ryoo, B-H. (Siontech Co., Ltd., Kyung Dong Navien Co., Ltd.). Deionization Electrode, Apparatus and Method for Deionization Electrode, Electrode Module and Deionization Module. *US. Patent* US11787711B2, Oct. 17, 2023.
2. Kang, K-S.; Lee, K-H.; Ryoo, B-H. (Siontech Co., Ltd.). Apparatus and Method for Removing Boron Contained in Radioactive Waste Liquid. *KR. Patent* KR102346894B1, Jan. 4, 2022.
1. S.E. Crawford, C.M. Andolina, D.C. Kaseman, B-H. Ryoo, A.M. Smith, K.A. Johnston, J. E. Millstone, "Efficient Energy Transfer from Near-Infrared Emitting Gold Nanoparticles to Pendant Ytterbium(III)", *J Am Chem Soc.* **139(49)**, 17767-17770 (2017).

## FELLOWSHIPS AND AWARDS

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- Art & Science Tuition Scholarship *Fall 2017 - Spring 2018*  
*University of Pittsburgh*
- Summer Research Fellowship *Summer 2016*  
*University of Pittsburgh*

## LANGUAGES

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Korean	Fluent
English	Fluent
Russian	Early Intermediate

## CIVIL STATUS

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Military Service **Served** (Sep 2019 - Sep 2022)