Bo Hyung Ryoo

Daejeon, South Korea
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RESEARCH FOCUS

Masters in Chemistry, Inorganic Nanomaterial Experiment *and* Theory.

EDUCATION

University of Pittsburgh, Chemistry Department Pittsburgh, PA
Master in Chemistry, Inorganic Chemistry *Aug. 2016 - Oct. 2019*
Research Advisor: Jill E. Millstone GPA:3.85

"Influence of Phosphine and Halide Ligands on the Properties of Undecagold Nanoclusters"

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

Saint Joseph High School Bridgeport, CT
High School Graduate *Sept. 2010 - Jun. 2012*

RESEARCH EXPERIENCE

SionTech Co. Ltd. Daejeon, South Korea
Senior Researcher (Technical Research Personnel) *Sep 2019 - present*
The research focuses on designing improved capacitative deionization (CDI) cells for commercial/industrial water purification and developing new methods on large-scale chemical depolymerization of polyesters for plastic-recycling.

ChemRep
Computer Scientist *May 2019 - present*
The research involves writing and open-sourcing complete python library used to execute machine learning (ML) algorithm for molecular representation

University of Pittsburgh Pittsburgh, PA
Graduate Student Researcher *Apr. 2016 - Oct. 2019*

The research involves synthesizing and analyzing atomically precise gold nanoclusters along with the use of density functional theory (DFT)

University of Pittsburgh Pittsburgh, PA

Undergraduate Student Researcher for Dr. Jill Millstone *Sept. 2013 - Apr. 2016*

The research involves synthesizing and analyzing gold nanoparticles along with the use of DFT

Carnegie Mellon University Pittsburgh, PA

Undergraduate Student Researcher for Dr. David Yaron *Apr. 2014 - Oct. 2014*

The research involved hotbit density dunctional tight binding theory (DFTB)calculation on atomic simulation environment (ASE) for faster and accurate geometry optimization

Korean Advanced Institute of Science and Technology Daejeon, S. Korea

High School Student Shadowing Under Dr. Yun-Ho Lee *May. 2011 - Oct. 2011*

The research involved the synthesis and design of catalytic metal complexes for industrial energy efficiency

PUBLISHED

9. 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* WO 10-2021-0086334, Jul. 2, 2021. *patent pending*

8. 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* WO 10-2021-00871497, Apr. 8, 2021. *patent pending*

7. 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* NO 17,186,985, Feb. 26, 2021. *patent pending*

6. Lee, K-H.; Ryoo, B-H.; Do, S-A.; Kang, K-S. (Siontech Co, Ltd). Capacitive Desalination Cell Performance Inspection Device. *KR. Patent* WO 10-2020-0154282, Nov. 18, 2020. *patent pending*

5. Kim, M-Y.; Kang, K-S.; Lee, K-H.; Ryoo, B-H. (Siontech Co, Ltd). Capacitive Deionization Electrode and Manufacturing Method Thereof. *KR. Patent* WO 10-20333-8770000, Nov. 11, 2020.

4. 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* NO US2021221711A1, Jan. 21, 2020. *patent pending*

3. 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* WO 10-2020-0004027, Jan. 13, 2020. *patent pending*

2. B-H. Ryoo, S.E. Crawford, N.L. Tolman, P.J. Straney, J. E. Millstone, "Controlling Gold Nanoparticle Shape Using Household Antioxidants: A Spectroscopy Study" *in preparation*

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).

TECHNIQUES

Characterization

- X-ray Diffractometry **(XRD)**
- UV-visible spectroscopy **(UV-Vis)**
- Photoluminescence Spectroscopy
- Transmission Electron Microscope **(TEM)**
- Fourier Transform Infrared Spectroscopy **(FTIR)**
- Raman Spectroscopy **(Raman)**
- Electron Paramagnetic Resonance Spectroscopy **(EPR)**
- Inductively Coupled Plasma Optical Emission Spectrometry **(ICP-OES)**

Wet Lab Techniques

- Metal nanomaterial syntheses
- Inert atmosphere techniques and syntheses
- Crystallization
- Pilot scale productions and engineerings

Computer Languages and Computational Chemistry

- Python
- Javascript
- React-Native

- Model and graphic design
  - pyplot
  - Visual Molecular Dynamics
  - Blender
  - Gimp
- Atomic Simulation Environment calculators (python based)
  - hotbit (DFTB)
  - GPAW (DFT)
  - ORCA (DFT)
- Other calculators
  - CP2K (DFT)
  - TURBOMOLE (DFT)

TEACHING EXPERIENCE

@ University of Pittsburgh, Chemistry Dept.:

CHEM1430: Physical Chemistry Laboratory	Fall 2016 - Spring 2019
CHEM0110: General Chemistry I	Fall 2017
Laboratory Manuals for Honors General Chemistry	Summer 2017
CHEM0250: General Chemistry for Engineers I	Fall 2016

@ University of Pittsburgh, Mathematics Dept.:

MATH0020: College Algebra	Spring 2015 - Spring 2016
Math tutor	Spring 2015 - Spring 2016

@ University of Pittsburgh, Chemistry Dept.:

Organic Chemistry I & **II**	Spring 2015 - Fall 2015
STEM-ulate Learning	Fall. 2014
General Chemistry	Fall 2013 - Spring 2014

FELLOWSHIPS

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

ONLINE CERTIFICATES

- Google IT Automation with Python Professional Certificate *Coursera: Google*
- Machine Learning *Coursera: Standford University*
- Intellectual Property Law *Coursera: University of Pennsylvania*
- Leading People and Teams Specialization *Coursera: University of Michigan*

LANGUAGE EFFICIENCY

Korean	Fluent
English	Fluent
Russian	Early Intermediate

CIVIL STATUS

Military Service **Currently serving** (Sep 2019 - Sep 2022)