

RESEARCH INTERESTS

- Quasi-equilibrium phase separation in high-pressure supercritical fluids
- Strongly coupled plasmas generated by high-power pulsed lasers
- Plasma diagnostics with UV/VIS spectroscopy and imaging

EDUCATION

Pohang University of Science and Technology (POSTECH)

Intergrated MS/Ph.D Course in Plamsa Physics

Pohang, Korea

Sep 2018 –

Pohang University of Science and Technology (POSTECH)

Bachelor of Sience in Physics

Pohang, Korea

Mar 2014 – Aug 2018

PROJECTS

- 1. Nanosecond timescale UV-VIS spectroscopy for high-density plasmas**
 - Accomplished an absolute calibration for a broadband UV-VIS spectrometer to measure spectral irradiance quantitatively.
 - Analyzed the continuum emission from plasma using the blackbody fitting method to measure emissivity and plasma temperature.
 - Estimated an electron density based on the ionization potential depression model.
- 2. Modular high-pressure chamber system for exploring thermodynamic properties of supercritical fluids**
 - Determined high-pressure supercritical fluids as a target for laser-produced plasmas, given that the supercritical fluids have no phase transition.
 - Designed and assembled a modular high-presure chamber system.
 - Developed various high-pressure chamber systems depending on the research purpose, including Rayleigh-Mie scattering, time-resolved OES, Raman spectroscopy, and small-angle neutron scattering.
- 3. Quasi-steady state of the strongly coupled plasma achieved through a coupling system of high voltage pulses and laser pulses**
 - Motivation for the quasi-steady state of strongly coupled plasma: Experimental investigation and analysis have been considerably difficult due to the transient nature of strongly coupled plasmas.
 - Developed a high-presure chamber with a spark plug to generate electron seeds and enhance laser energy coupling.
 - Extended the lifetime of strongly coupled plasmas by combining with a high voltage DC pulse.
- 4. Femtosecond laser system based on the chirped-pulse amplification technique**
 - Built and maintained a femtosecond laser system (10 Hz, 30 fs, 30 mJ).
 - Generated a strongly coupled plasma using the femtosecond pulse laser and conducted optical diagnoses.
- 5. Small-angle neutron scattering experiements to investigate clusters in high-pressure supercritical fluids**
 - Designed a modular high-pressure chamber system for SANS experiment.
 - Measured the neutron scattering signals from supercritical fluids and analyzed the resulting data.
 - Identified evidence of nano-sized clusters persisting in supercritical fluids.

PUBLICATIONS

• Journal

1. S. Lee, J. Lee, Y. D. Yoon, D. E. Kim* and G. Yun*, “Characterization of strongly coupled plasmas produced in argon supercritical fluids”, *Plasma Phys. Control. Fusion* **64**, 095010 (2022)
2. S. Lee, J. Lee, Y. Kim, S. Jeong, D. E. Kim* and G. Yun*, “Quasi-equilibrium phase separation in single component supercritical fluids”, *Nat. Commun.* **12**, 4630 (2021)

• Conference

1. J. Lee, S. Lee, and G. Yun, “Enhanced energy confinement of strongly coupled plasma within a phase-coexisting supercritical fluid”, 49th International Conference on Plasma Science, Seattle, Washington, May 22 – 26, 2022
2. J. Lee, S. Lee and G. Yun, “Charge and energy confinement of strongly coupled plasma within a phase-coexisting supercritical fluid”, *2021 KPS Fall Meeting*, Virtual, Korea, Oct 20 – 22, 2021
3. J. Lee, S. Lee, D. E. Kim and G. Yun, “Non-equilibrium clustering and droplet formation in supercritical fluids and their effects on the laser-produced plasmas”, *2021 KPS Spring Meeting*, Virtual, Korea, Apr 21 – 23, 2021
4. J. Lee, S. Lee, D. E. Kim and G. Yun, “Characterization of long-lived clusters in supercritical fluid using Rayleigh-Mie scattering and effects on laser plasma”, *2018 KPS Fall Meeting*, Gwangju, Korea, Oct 23 – 25, 2019

TEACHING EXPERIENCES

Student Teaching Assistant Statistical Mechanics for graduate student (PHYS512)	POSTECH Fall 2019
Student Teaching Assistant Teaching Assistant for General Physics I (PHYS101)	POSTECH Spring 2019
Student Teaching Assistant Teaching Assistant for General Physics II (PHYS102)	POSTECH Fall 2018

HONORS AND AWARDS

2023 KPS Spring Meeting Best Student Oral Presentation Award	Korean Physical Society 2023
2021 KPS Fall Meeting Best Student Oral Presentation Award	Korean Physical Society 2021
2021 KPS Spring Meeting Best Student Poster Presentation Award	Korean Physical Society 2021
2019 KPS Fall Meeting Best Student Oral Presentation Award	Korean Physical Society 2019

RESEARCH GRANTS

BK21, POSTECH Alchemist Program Sep 2021 – Aug 2022	Postech, BK21, Korea
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