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Min-Cheol Lee

SOFTWARE RESEARCH ENGINEER/SCIENTIST AT INTEL CORPORATION

Ph.D. in Physics, Software engineer responsible for the research and development of the resolution enhancement technologies (RET) for the nanoscale photo-lithographic process.

Optical spectroscopy scientist and material scientist with expertise in ultrafast spectroscopy of optical and X-ray lights, and multifunctional quantum materials, including strongly correlated electron systems and topological materials.

EDUCATION

2019	PH.D IN PHYSICS	Seoul National University (GPA 3.64/4.3)	Seoul, South Korea
2013	B.S IN PHYSICS	Seoul National University (GPA 3.70/4.3)	Seoul, South Korea

STATUS

NON-IMMIGRANT VISA | O-1A | Intel Corporation

WORK EXPERIENCE

2022 – present — SOFTWARE RESEARCH ENGINEER/SCIENTIST | Intel Corporation, OR, USA

- Developing and implementing models and software to perform layout correction for high resolution reproduction on wafers.
- Applying software engineering methods, theories and research in the investigation and solution of technical RET problems.

2019 – 2022 — POSTDOCTORAL RESEARCHER | Los Alamos National Laboratory, NM, USA

- Constructed experiments of ultrafast spectroscopy using femtosecond infrared (IR), terahertz (THz) from home-lab systems, as well as femtosecond X-ray pulses from X-ray free-electron laser (XFEL) facilities at SLAC-LCLS, PAL-XFEL, and SPring8-SACLA
- Investigated non-equilibrium dynamics of optical properties and crystal structures in superconducting and topological materials

2013 – 2019 — GRADUATE RESEARCH ASSISTANT | Seoul National University, South Korea

- Constructed home lab near-infrared/terahertz pump-probe spectroscopic system
- Constructed experiments of X-ray absorption and photoemission spectroscopy at synchrotron facilities – PAL (South Korea), NSRRC (Taiwan)
- Investigated crystal and electronic structures coupled to magnetism in Mott insulators and superconductors (ruthenate, rhodate, iridate and pnictide)
- Thesis title: *"Non-equilibrium Spectroscopic Studies on Coherent Phonon Oscillations in Transition Metal Compounds"*

SKILLS

SPECTROSCOPY

Ultrafast spectroscopy – pump-probe technique utilizing ultrashort IR, THz and X-ray pulses | IR spectroscopy – Ellipsometry, FTIR | THz spectroscopy – THz generation/detection by optical rectification/electro-optic sampling (0.3 – 20 THz), THz time-domain spectroscopy | X-ray spectroscopy/diffraction – X-ray absorption/photoemission spectroscopy (XAS/XPS/ARPES), magnetic circular/linear dichroism, Resonant X-ray scattering, X-ray diffraction (XRD), time-resolved XRD, Laue diffraction

LASER

Ultrafast optical/IR laser – optical layout design, non-linear optics, maintenance and repair of Ti:Sapphire laser oscillator/amplifier and optical parametric amplifier (OPA) |
XFEL – experienced at SPring-8-SACLA (Japan), PAL-XFEL (South Korea), and SLAC-LCLS (USA)

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OTHER TECHNIQUES Ultra-high vacuum technology | Low-temperature technology – liquefied He and N_2

PROGRAMMING Python, MATLAB, Origin, Igor – statistical experimental data analysis and plotting, optical/physical simulations | LabVIEW – device control and experiment design | VESTA – crystal structure visualization and simulation | Adobe Illustrator, Photoshop, Premiere – graphic and video design

PUBLICATIONS & PRESENTATIONS

PUBLICATIONS 20 academic publications | 8 as First Author | google scholar
(1 Nature Materials, 2 Physical Review Letter, 1 Advance Materials, 9 Physical Review B)

SELECTED PUBLICATIONS

Physical Review Letters in press (2022). "Direct Observation of Coherent Longitudinal and Shear Acoustic Phonons in the Weyl Semimetal TaAs Using Ultrafast X-ray Diffraction", Min-Cheol Lee and R. Prasankumar *et al.*

Nature Materials 21, 62-66 (2022). "Photocurrent-driven transient symmetry breaking in the Weyl semimetal TaAs" N. Sirica, P. P. Orth, M. S. Scheurer, Y. M. Dai, Min-Cheol Lee, R. P. Prasankumar *et al.*

Advanced Materials 30, 1704777 (2018). "Spectroscopic studies on metal-insulator transition mechanism in correlated materials" S. Y. Kim and Min-Cheol Lee* *et al.*, (*co-1st author)

PROFESSIONAL ACTIVITIES Journal Referee for
Physical Review Letters, Physical Review B, Communications Physics, and *Scientific Reports*

PRESENTATIONS 8 international conferences | 1 invited talk

HONORS & AWARDS

FELLOWSHIPS

BK (Brain Korea) scholarship	Seoul National University	2013, 2018-2019
Baek-Un Fellowship	Baek-Un Scholarship Foundation	2015
GSI Fellowship	Seoul National University	2014-2015
National Science and Engineering Undergraduate Scholarship	Korea Student Aid Foundation	2009-2013

AWARDS Outstanding Ph.D. Thesis Award in 2019 | Seoul National University
1st prize awarded in *2018 IBS Art in Science* | "A piece of femto-galaxy" (link)

SERVICE Military service in Korea Army | Technical Research Personnel | 2016-2019

REFERENCES

Dr. Rohit Prasankumar Technical Staff Member, Los Alamos National Laboratory, Los Alamos, NM, USA
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