Jeongmin Kim

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RESEARCH INTERESTS

- Super-resolution optical microscopy methods and their application study
- Advanced optical imaging and manipulation systems for biology and medicine
- Novel photonic systems and devices for biology research, healthcare applications and bio/chemical sensing

EDUCATION

Ph.D. Mechanical Engineering, University of California at Berkeley, USA — Aug 2016
- Emphasis in Nanoscale Science and Engineering
- Minors in Physics and Electrical Engineering
- GPA: 4.0/4.0 (six A^+ grades among 11 courses taken)
- Dissertation: High-aperture optical microscopy methods for super-resolution deep imaging and quantitative phase imaging (Advisor: Prof. Xiang Zhang)

M.S. Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Korea — Feb 2006
- *Valedictorian* (GPA: 4.13/4.3)
- Thesis: Spectrally encoded slit confocal microscopy with nano-resolution and real-time imaging capability (Advisor: Prof. DaeGab Gweon)

B.S. Mechanical Engineering, Kyungpook National University, Korea — Feb 2004
- *Summa cum Laude* (Ranking: 1/51, GPA: 4.23/4.3)

EMPLOYMENT AND APPOINTMENT

- Assistant Professor, Dept. of Transdisciplinary Studies, Seoul National University, Korea — Mar 2020-Present
- Postdoctoral Scholar – Prof. Ke Xu group, QB3 and Dept. of Chemistry, UC Berkeley — Mar 2019-Feb 2020
- Postdoctoral Scholar – Prof. Xiang Zhang group, Dept. of Mechanical Engineering, UC Berkeley — Sep 2016-Feb 2019
- Graduate Student Researcher – Dept. of Mechanical Engineering, UC Berkeley — Summer 2012, May 2014-Aug 2016
- Grad Student Researcher – Materials Sciences Division, Lawrence Berkeley National Laboratory — Jun 2013-Aug 2013
- Optical Engineer – Manufacturing Technology R&D Center, Samsung Electronics, Korea — Feb 2006-Jun 2011
- Technical Research Personnel (alternative military service) – Samsung Electronics, Korea — May 2006-May 2009
- Graduate Research Assistant – Dept. of Mechanical Engineering, KAIST, Korea — Oct 2004-Feb 2006

AWARDS AND HONORS

- PicoQuant Young Investigator Award – SPIE Photonics West (BiOS) conference, San Francisco, USA — Feb 2019
- Graduate Division Block Grant Award for Distinguished Academic Record – UC Berkeley — Apr 2015
- STX Overseas Graduate Student Scholarship – STX Scholarship Foundation, Korea — July 2011
- Best M.S. Graduate Award – Department of Mechanical Engineering, KAIST, Korea — May 2006
- Academic Excellence Scholarship – Iljung Scholarship Foundation, Korea — Sep 2001-Dec 2003
- Undergraduate Merit-based Scholarship – Kyungpook National University, Korea — Mar 2000-Jun 2001

KEY RESEARCH ACHIEVEMENTS

PUBLICATION REF. NO. IN **[ ]**

- Developed oblique-plane single-molecule microscopy (obSTORM) that enables super-resolution imaging of higher-level biological samples such as thick tissues and small animals (***Nature Methods*** [3])
- Experimentally demonstrated the theoretical concept of lasing and anti-lasing in a single cavity based on parity-time symmetry, potentially applicable as light sources or modulators in photonic integrated circuits (***Nature Photonics*** [9])
- Proposed and experimentally proved the existence of the two-way asymmetric optical element, like diodes in electronic devices, based on nonlinear metasurfaces (***Physical Review Letters*** [4])
- Calculated rigorous imaging resolution of direct oblique plane microscopy for the first time (***Optics Express*** [13])
- Proposed a generalized calculation method of vectorial diffraction in optical focusing/imaging systems (***JOSA A*** [6])

PEER-REVIEWED PUBLICATIONS

† equal contribution, * correspondence, first or co-first authored publication, IF (2-year impact factor, 2018)

1. Y. Xia†, Q. Li†, **J. Kim**, W. Bao, C. Gong, S. Yang, Y. Wang and X. Zhang*, "Room-temperature giant Stark effect of single photon emitter in van der Waals material," ***Nano Letters*** 19, 7100-7105 (2019) [IF: 12.279]
2. W. Bao†, X. Liu†, F. Xue†, F. Zheng, R. Tao, S. Wang, Y. Xia, M. Zhao, **J. Kim**, S. Yang, Q. Li, Y. Wang, Y. Wang, L.-W. Wang, A.H. MacDonald* and X. Zhang*, "Observation of Rydberg exciton polaritons and their condensate in a perovskite cavity," ***Proceedings of the National Academy of Sciences, USA*** 116, 20274-20279 (2019) [IF: 9.58]
3. **J. Kim**, M. Wojcik, Y. Wang, S. Moon, E.A. Zin, N. Marnani, Z.L. Newman, J.G. Flannery, K. Xu* and X. Zhang*, "Oblique-plane single-molecule localization microscopy for tissues and small intact animals," ***Nature Methods*** 16, 853-857 (2019) [IF: 28.467]
4. N. Shitrit†, **J. Kim**†, D.S. Barth, H. Ramezani, Y. Wang and X. Zhang*, "Asymmetric free-space light transport at nonlinear metasurfaces," ***Physical Review Letters*** 121, 046101 (2018) [IF: 9.227]
5. **J. Kim**, Y. Wang and X. Zhang*, "Comparison of different theories for focusing through a plane interface: comment," ***Journal of the Optical Society of America A*** 35, 591-592 (2018) [IF: 1.861]
6. **J. Kim**, Y. Wang and X. Zhang*, "Calculation of vectorial diffraction in optical systems," ***Journal of the Optical Society of America A*** 35, 526-535 (2018) [IF: 1.861]
7. A. Labno, C. Gladden, **J. Kim**, D. Lu, X. Yin, Y. Wang, Z. Liu* and X. Zhang*, "Three-dimensional nanoscale imaging by plasmonic Brownian microscopy," ***Nanophotonics*** 7, 489-495 (2018) [IF: 6.908]
8. P.K. Jha†, N. Shitrit†, **J. Kim**, X. Ren, Y. Wang and X. Zhang*, "Metasurface-mediated quantum entanglement," ***ACS Photonics*** 5, 971-976 (2018) [IF: 7.143]
9. Z.J. Wong†, Y.L. Xu†, **J. Kim**†, K. O'Brien, Y. Wang, L. Feng* and X. Zhang*, "Lasing and anti-lasing in a single cavity," ***Nature Photonics*** 10, 796-801 (2016) [IF: 31.583]
10. P.K. Jha, M. Mrejen, **J. Kim**, C. Wu, Y. Wang, Y. Rostovtsev and X. Zhang*, "Coherence-driven topological transition in quantum metamaterials," ***Physical Review Letters*** 116, 165502 (2016) [IF: 9.227]
11. T. Li†, S. Ota†, **J. Kim**, Z.J. Wong, Y. Wang, X. Yin and X. Zhang*, "Axial plane optical microscopy," ***Scientific Reports*** 4, 7253 (2014) [IF: 4.011]
12. P.K. Jha, M. Mrejen, **J. Kim**, C. Wu, X. Yin, Y. Wang and X. Zhang*, "Interacting dark resonances with plasmonic meta-molecules, ***Applied Physics Letters*** 105 (2014) [IF: 3.521]
13. **J. Kim**, T. Li, Y. Wang and X. Zhang*, "Vectorial point spread function and optical transfer function in oblique plane imaging," ***Optics Express*** 22, 11140-11151 (2014) [IF: 3.561]
14. S. Xiong*, **J. Kim**, Y. Wang, X. Zhang and D. Bogy, "A two-stage heating scheme for heat assisted magnetic recording," ***Journal of Applied Physics*** 115, 17B702 (2014) [IF: 2.328]
15. **J. Kim***, D. Kang and D. Gweon, "Spectrally encoded slit confocal microscopy," ***Optics Letters*** 31, 1687-1689 (2006)

[IF: 3.866]

PATENTS

1. T. Li, S. Ota, **J. Kim**, Y. Wang and X. Zhang, "Multiplane optical microscope," US Patent Pub. No. 9823457B2 (2017)
2. **J. Kim**, S. Bae and S. Jang, "Maskless exposure apparatus and stitching exposure method using the same," Korea Patent Pub. No. KR101095549B1 (2011); US Patent Pub. No. US9019471B2 (2015)

INVITED TALK

1. **J. Kim**, "Optical microscopic imaging for studying biology and photonic devices," Seminar, Dept. of Information and Communication Engineering, Daegu Gyeongbuk Institute of Science and Technology, Daegu, Korea (Sep 2019)
2. **J. Kim**, "Super-resolution optical microscopy for biology," Colloquium, Department of Physics, Kyungpook National University, Daegu, Korea (Sep 2019)

CONFERENCE PRESENTATIONS (SELECTED)

*** PRESENTER**

1. **J. Kim***, M. Wojcik, Y. Wang, K. Xu and X. Zhang, "Oblique lightsheet STORM for tissue samples," SPIE Photonics West (BiOS, *won PicoQuant Young Investigator Award*), San Francisco, CA, USA (2019)
2. **J. Kim***, M. Wojcik, Y. Wang, K. Xu and X. Zhang, "Oblique-Sectional Single-Molecule Microscopy," IEEE Photonics Conference, Reston, VA, USA (2018)
3. N. Shitrit*, **J. Kim**, D.S. Barth, H. Ramezani, Y. Wang and X. Zhang, "Asymmetric Light Transport at Nonlinear Metasurfaces," Conference on Lasers and Electro-Optics (CLEO), FTh1D.5, San Jose, CA, USA (2018)
4. S. Yang*, W. Bao, X. Liu, **J. Kim**, R. Zhao, Y. Wang and X. Zhang, "Accelerating Emission dynamics in Perovskites Plasmonic Nanolasers," CLEO, SM4I.1, San Jose, CA, USA (2018)
5. **J. Kim***, M. Wojcik, Y. Wang, K. Xu and X. Zhang, "Oblique single-molecule nanoscopy for thick biological samples," CLEO, JTh5C.7 (*prestigious postdeadline accepted presentation*), San Jose, CA, USA (2018)
6. Q. Li*, Y. Xia, **J. Kim**, W. Bao, Y. Wang and X. Zhang, "Electrical control of single photon emitter in layered hexagonal boron nitride," APS (American Physical Society) March Meeting, Los Angeles, CA, USA (2018)
7. P.K. Jha*, N. Shitrit, **J. Kim**, X. Ren, Y. Wang and X. Zhang, "Metasurface Route to Quantum Photonics," SPIE Optics and Photonics, San Diego, CA, USA (2017)
8. N. Shitrit*, P. K. Jha, J. Kim, X. Ren, Y. Wang and Xiang Zhang, "Metasurface-enabled on-chip quantum entanglement," CLEO, FTu3G.2, San Jose, CA, USA (2017)
9. Z.J. Wong*, Y.L. Xu, **J. Kim**, K. O'Brien, Y. Wang, L. Feng and X. Zhang, "PT-Symmetric Laser and Anti-Laser," Frontiers in Optics, FF2B.4, Rochester, NY, USA (2016)
10. P.K. Jha*, M. Mrejen, **J. Kim**, C. Wu, Y. Wang, Y.V. Rostovtsev and X. Zhang, "Trapped ultracold atoms make perfect quantum metamaterials," Frontiers in Optics, FTu1G, Rochester, NY, USA (2016)
11. P.K. Jha*, M. Mrejen, **J. Kim**, C. Wu, Y. Wang, Y.V. Rostovtsev and X. Zhang, "Topologically reconfigurable atomic lattice quantum metamaterial," CLEO, FF1D.6, San Jose, CA, USA (2016)
12. **J. Kim***, T. Li, Y. Wang and X. Zhang, "Resolving power in direct oblique plane imaging," SPIE Photonics West (BiOS), San Francisco, CA, USA (2015)
13. T. Li*, S. Ota, **J. Kim**, Z.J. Wong, Y. Wang, X. Yin and X. Zhang, "Wide-field axial plane optical microscopy," Frontiers in Optics, FW4G.1, Tucson, AZ, USA (2014)
14. **J. Kim***, T. Li, Y. Wang and X. Zhang, "Optical resolution in wide-field oblique plane microscopy," OSA (Optical Society of America) Classical Optics Congress (*postdeadline accepted presentation*), Hawaii, USA (2014)
15. M. Mrejen*, P.K. Jha, **J. Kim**, C. Wu, Y. Wang, X. Yun and X. Zhang, "Interacting dark resonances with metallic

nano-antennas," CLEO, FM2K.3, San Jose, CA, USA (2014)

16. **J. Kim***, D. Kang, D. Gweon, Y. Sohn and H. Cho, "Design of real-time confocal microscopy using spectral encoding technique and slit aperture," Optomechatronic Technologies, Sapporo, Japan (2005)

RESEARCH EXPERIENCE

- Biological applications of super-resolution optical microscopy — Feb 2019-Present
- Advanced optical imaging theory and development of innovative optical microscopy methods — Jan 2013-Present
- Metamaterials for quantum photonics and novel photonic devices — Jun 2013-Dec 2017
- On-chip laser and absorber at a telecom wavelength — Aug 2014-Dec 2015
- Plasmonics for advanced nano-manufacturing and heat-assisted magnetic recording — Aug 2011-Sep 2014
- Instrumentation of holographic and maskless lithography for Samsung's LCD manufacturing — Aug 2006-Jun 2011
- High-speed confocal microscopy for industrial applications (measurement and inspection) — Feb 2005-Feb 2006

PROFESSIONAL SERVICE AND MEMBERSHIP

- Journal Referee: *Angewandte Chemie*, *Applied Physics Review*, *Physical Review Applied*, *Applied Physics Letters, Optics Letters, Biomedical Optics Express, Optics Express, Applied Optics, Journal of the Optical Society of America A, Microsystem Technologies* 2017-Present
- Membership: Optical Society of America (OSA), International Society for Optical Engineering (SPIE), IEEE Photonics Society

LEADERSHIP

- Mentor for two PhD students in Prof. Xiang Zhang group, UC Berkeley — 2017-2018
- Technical liaison of Samsung Electronics (Korea) to Corning Tropel Corp. (Rochester, NY) — Jun 2007-Dec 2010
- On-the-job trainer and Mentor for new assistant engineers, Samsung Electronics, Korea — 2009-2010
- Change Agent for The Great Place to Work®, Samsung Electronics, Korea — 2008
- Academic division leader, Kyungpook National University Amateur Astronomy Association, Korea — 2001

OTHER EXPERIENCE

- 4D Advanced Microscopy in Brain Circuits Course, Zeiss Berkeley Brain Microscopy Innovation Center (BrainMIC) and Berkeley Molecular Imaging Center, UC Berkeley — Jan 2016
- Physics of Living Cells Summer School, Dept. of Physics, University of Illinois at Urbana-Champaign — July 2014

OTHER GRANTS AND SCHOLARSHIPS

- Wollenberg Grant – International House, Berkeley, CA, USA — Spring 2015
- SPIE Travel Scholarship, USA — Feb 2015
- Mortimer Fleishhacker Scholarship – International House, Berkeley, CA, USA — Fall 2013-Spring 2014
- Wollenberg Grant – International House, Berkeley, CA, USA — Fall 2012-Spring 2013
- Korea Government Scholarship at KAIST, Korea — Mar 2004-Feb 2006

TECHNICAL AND SCIENTIFIC SKILLS

- Optics: system design and analysis (including tools: ZEMAX, Code V, LightTools), home-built microscope construction (conventional fluorescence, TIRF, confocal, STORM, lightsheet), various measurement setups (*k*-space, pump-probe, lifetime, spectroscopy, interferometry, holography)
- Micro/nano fabrication (member of Berkeley Marvell Nanofabrication Laboratory, 2011-2019): e-beam lithography,

photolithography, focused ion beam (FIB), dry/wet etching, sputtering, evaporation, coating, dicing, SEM, AFM

- Biology: cell culture, immunostaining (IF and IHC)
- CAD/CAE: Solid Edge, SolidWorks, IDEAS, Pro/Engineer, ANSYS
- Machine tool: lathe, milling machine, drill press
- Numerical calculation and optimization: MATLAB, Fortran, C/C++
- Other software language or tools: Visual Studio (MFC), LabVIEW, MATLAB GUIDE, HTML, Adobe Photoshop and Illustrator, ImageJ, LaTeX

REFERENCES

- **Emeritus Prof. DaeGab Gweon** (MS advisor)
  - Korea Advanced Institute of Science and Technology (KAIST)
    Department of Mechanical Engineering
  - Email: gweondg@kaist.ac.kr
    Phone: +82 (042) 350-3011
    Mail: N7-4205, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, South Korea

- **Prof. Xiang Zhang** (PhD and postdoctoral advisor)
  - University of California at Berkeley
    Department of Mechanical Engineering
  - President and Vice-Chancellor, University of Hong Kong (HKU), Hong Kong
  - Email: xiang@berkeley.edu
    Phone: +1 (510) 643-4978
    Mail: 5130 Etcheverry Hall, Berkeley, CA 94720-1740, USA

- **Assistant Prof. Ke Xu** (Postdoctoral advisor)
  - University of California at Berkeley
    Department of Chemistry; California Institute for Quantitative Biosciences (QB3)
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