

Xiaoji G. Xu

CONTACT INFORMATION	Department of Chemistry Lehigh University 6 East Packer Avenue Bethlehem, PA, USA	<i>Mobile phone:</i> 215-966-9757 <i>Office phone:</i> 610-758-6271 <i>E-mail:</i> xgx214@lehigh.edu <i>E-mail:</i> xiaojixu@gmail.com
EDUCATION	Ph.D. Chemistry, University of British Columbia, Vancouver, Canada B.S. Chemistry, Peking University, Beijing, China	2009 2004
ACADEMIC POSITIONS	Associate Professor Department of Chemistry, Lehigh University, Bethlehem, PA, USA Assistant Professor Department of Chemistry, Lehigh University, Bethlehem, PA, USA Postdoctoral researcher Department of Chemistry and Physics, University of Toronto, ON, Canada Postdoctoral research associate Department of Physics and JILA, University of Colorado, Boulder, CO, USA Postdoctoral research associate Department of Chemistry, University of Washington, Seattle, WA, USA	Oct. 2020 to present Nov. 2014 to Oct. 2020 Mar. 2012 to Nov. 2014 Sep. 2010 to Dec. 2011 Sep. 2009 to Aug. 2010
AWARD, FELLOWSHIP AND RECOGNITION	Camille Dreyfus Teacher-Scholar, Camille and Henry Dreyfus Foundation, 2021 Class of '61 Professorship of Lehigh University 2021-2023 Sloan Research Fellowship, Alfred P. Sloan Foundation, 2020 CAREER Award, National Science Foundation, 2019 Beckman Young Investigator, Arnold and Mabel Beckman Foundation, 2018 Class of 68 Pre-tenure Research Fellowship, Lehigh University, 2015, 2016, 2017 University Graduate Fellowship, University of British Columbia, 2008 C D Howe Fellowship, University of British Columbia, 2008 Gladys Estella Laird Research Fellowship, University of British Columbia, 2008 Ed Shutter Scholarship ,University of British Columbia 2005	
PATENTS	<ol style="list-style-type: none">Xiaoji Xu and Gilbert C. Walker "Method to obtain absorption spectra from near-field infrared scattering using homodyning detection " US8646110B1 (licensed to industrial partner through University of Toronto IP office)Chanmin Su, Martin Wagner, and Xiaoji Xu, "Infrared Characterization of a Sample Using Oscillating Mode" US Patent 10,845,382 (Licensed to industrial partner through Lehigh's technology transfer office)Haomin and Xiaoji Xu "A Non-tapping Mode Scattering-type Scanning Near-field optical microscopy" US16/963,917 and PCT App. No.PCT/US2019/14572 (Licensed to industrial partner through Lehigh's technology transfer office)	
PEER-REVIEWED PUBLICATIONS SINCE WORKING AT LEHIGH	<ol style="list-style-type: none">H. Wang, Q. Xie, Y. Zhang, and X. G. Xu "Photothermally Probing Vibrational Excited-State Absorption with Nanoscale Spatial Resolution through Frequency-Domain Pump-Probe Peak Force Infrared Microscopy" <i>The Journal of Physical Chemistry C</i>, 125, 15, 8333-8338 2021H. Wang, J. González-Fialkowski, W. Li, Q. Xie, Y. Yu, and X. G. Xu "Liquid-Phase Peak Force Infrared Microscopy for Chemical Nano-imaging and Spectroscopy " <i>Analytical Chemistry</i>, 93, 7, 3567 2021	

3. Y. Zhang, C. Yurdakul, A. J. Devaux, L. Wang, **X. G. Xu**, J. H. Connor, M. S. Unlu, and J-X. Cheng "Vibrational Spectroscopic Detection of a Single Virus by Mid-Infrared Photothermal Microscopy " *Analytical Chemistry*, 93, 8, 4100-4107 **2021**
4. H. Wang, L. Wang, E. Janzen, J. H. Edgar, and **X. G. Xu** "Total Internal Reflection Peak Force Infrared Microscopy " *Analytical Chemistry*, 93, 2, 731-736 **2021**
5. M. Li, H. Wang, W. Li, **X. G. Xu**, and Y. Yu "Macrophage activation on "phagocytic synapse" arrays: Spacing of nanoclustered ligands directs TLR1/2 signaling with an intrinsic limit " *Science Advances* 6, eabc8482, **2020**
6. C. Gusenbauer, T. Nypelö, D. S. Jakob, **X. G. Xu**, D. V. Vezenov, S. Asaadi, H. Sixta, and J. Konnerth "Differences in surface chemistry of regenerated lignocellulose fibers determined by chemically sensitive scanning probe microscopy" *International Journal of Biological Macromolecules* 165, 2520-2527, **2020**
7. H. Wang, L. Wang, Y. Shang, S. Y. Tafti, W. Cao, Z. Ning, X.F. Zhang, and **X. G. Xu** "Peak Force Visible Microscopy " *Soft Matter* 16, 8372-8379 **2020 (Emerging Investigators Issue 2021)**
8. C. Gusenbauer, D. S. Jakob, **X. G. Xu**, D. V. Vezenov, É. Cabane, and J. Konnerth "Nanoscale Chemical Features of the Natural Fibrous Material Wood" *Biomacromolecules* 21, 10, 4244-4252 **2020**
9. D. S. Jakob, H. Wang, G. Zeng, D. E. Otzen, Y. Yan, and **X. G. Xu** "Peak Force Infrared – Kelvin Probe Force Microscopy " *Angewandte Chemie Int. Ed.* 59, 16083 **2020 (Hot Paper)**
10. W. Li, H. Wang, **X. G. Xu** and Y. Yu "Simultaneous Nanoscale Imaging of Chemical and Architectural Heterogeneity on Yeast Cell Wall Particles" *Langmuir* 36, 22, 6169-6177 **2020**
11. H. Wang, E. Janzen, J. H. Edgar, and **X. G. Xu** "Probing Mid-Infrared Phonon Polaritons in the Aqueous Phase " *Nano Letters* 20, 5, 3986-3991 **2020**
12. D. S. Jakob, H. Wang, G. Zeng, and **X. G. Xu** "Pulsed Force Kelvin Probe Force Microscopy" *ACS Nano* 14, 4, 4839-4848 **2020**
13. H. Wang, J. Li, J. H. Edgar, and **X. G. Xu** "Three-dimensional Near-field Anatomy Through Peak Force Scattering-type Near-field Optical Microscopy " *Nanoscale* 12, 1817-1825 **2020**
14. L. Wang, M. Wagner, H. Wang, S. Pau-Sanchez, J. Li, J. H. Edgar, and **X. G. Xu** "Revealing Phonon Polaritons in Hexagonal Boron Nitride by Multi-pulse Peak Force Infrared Microscopy " *Advanced Optical Materials* 1901084 **2019**
15. L. Wang, D. S. Jakob, H. Wang, A. Apostolos, M. Pires, and **X. G. Xu** "Generalized Heterodyne Configurations for Photo-induced Force Microscopy " *Analytical Chemistry* 91,20, 13251 **2019**
16. C. Phillips, L. Gilburd, **X. G. Xu**, and G. C. Walker "Surface and Volume Phonon Polaritons in Boron Nitride Nanotubes " *Journal of Physical Chemistry Letters* 10,17, 4851 **2019**
17. D. S. Jakob, L. Wang, H. Wang, and **X. G. Xu** "Spectro-mechanical Characterization of Aromaticity and Maturity of Kerogens in Oil Shale at 6 nm Spatial Resolution " *Analytical Chemistry* 91, 14, 8883 **2019**
18. L. Wang, H. Wang, D. V. Vezenov, and **X. G. Xu** "Direct Measurement of Photo-Induced Force for Nanoscale Infrared Spectroscopy and Chemical-Sensitive Imaging " *The Journal of Physical Chemistry C* 122, 23808 **2018**
19. H. Wang, L. Wang, D. S. Jakob, and **X. G. Xu** "Tomographic and multimodal scattering-type scanning near-field optical microscopy with peak force tapping mode " *Nature Communications* 9:2005 **2018**
20. M. Wagner, D. S. Jakob, S. Horne, H. Mittel, S. Osechinskiy, C. Phillips, G. C. Walker, C. Su, and **X. G. Xu** "Ultra-broadband Nano-spectroscopy with a Laser-driven Plasma Source " *ACS Photonics* 5, 4, 1467 **2018**
21. J-H. Jiang, **X. G. Xu**, L. Gilburd, and G. C. Walker "Optical hot-spots in boron-nitride nanotubes at mid infrared frequencies: one-dimensional localization due to random-

- scattering " *Optics Express* 25(21), 25059 **2017**
22. L. Wang, D. Huang, C. K. Chan, Y.J. Li, and **X. G. Xu** "Nanoscale Spectroscopic and Mechanical Characterization of Individual Aerosol Particles with Peak Force Infrared Microscopy " *Chemical Communications* 53, 7397 **2017 (Emerging Investigators Issue 2017)**
 23. L. Wang, H. Wang, M. Wagner, Y. Yan, D. Jakob, and **X. G. Xu** "Nanoscale Simultaneous Chemical and Mechanical Imaging via Peak Force Infrared Microscopy " *Science Advances* 3, e1700255 **2017**
 24. H. Wang, L. Wang, D. S. Jakob, and **X. G. Xu** "Mapping three-dimensional near-field responses with reconstruction scattering-type scanning near-field optical microscopy " *AIP Advances* 7, 055118 **2017**
 25. H. Wang, L. Wang, and **X. G. Xu** "Scattering-type Scanning Near-field Optical Microscopy with Low Repetition Rate Pulsed Light Source through Phase-domain Sampling " *Nature Communications*, 7:13212 **2016**
 26. **X. G. Xu**, L. Gilburd, Y. Bando, D. Golberg, and G. C. Walker "Defects and Deformation of Boron Nitride Nanotubes Studied by Joint Nanoscale Mechanical and Infrared Near-Field Microscopy" *Journal of Physical Chemistry C*, 120 (3) 1945 **2016**
 27. L. Gilburd, **X. G. Xu**, Y. Bando, D. Golberg, and G. C. Walker "Near-Field Infrared Pump-Probe Imaging of Surface Phonon Coupling in Boron Nitride Nanotubes" *Journal of Physical Chemistry Letters*, 7 289, **2016**
 28. L. Wang, and **X. G. Xu** "Scattering Type Scanning Near-field Optical Microscopy with Reconstruction of Vertical Interaction " *Nature Communications*, 6:8973 **2015**

SUBMITTED PAPER
AND PREPRINT

1. D. S. Jakob, N. Li, H. Zhou, and **X. G. Xu** "Integrated Tapping Mode Kelvin Probe Force Microscopy with Photo-induced Force Microscopy for Correlative Chemical and Surface Potential Mapping" (under review)

PEER-REVIEWED
PUBLICATIONS
PRIOR TO
INDEPENDENT
RESEARCH CAREER

1. **X. G. Xu**, L. Gilburd, and G. C. Walker "Phase Stabilized Homodyne of Infrared Scattering Type Scanning Near-field Optical Microscopy" *Applied Physics Letters* , 105, 263104 **2014** (co-corresponding author)
2. **X. G. Xu**, J-H. Jiang, L. Gilburd, C. Y. Zhi, Y. Bando, D. Golberg, and G. C. Walker "Mid-Infrared Polaritonic Coupling between Boron Nitride Nanotubes and Graphene" *ACS Nano*, 8, 11305 **2014**
3. B. G. Ghamsari, **X. G. Xu**, L. Gilburd, G. C. Walker and P. Berini "Mid Infrared Surface Phonon Polaritons in Boron Nitride Nanotubes " *Journal of Optics* 16 114008 **2014**
4. **X. G. Xu**, B. G. Ghamsari, J-H. Jiang, G. O. Andreev L. Gilburd, C. Y. Zhi, Y. Bando, D. Golberg, P. Berini, and G. C. Walker "One-dimensional Surface Phonon Polaritons in Boron Nitride Nanotubes " *Nature Communications* 5:4782 **2014** (High-lighted by *Nature Materials* 13.12 (2014): 1081-1083.)
5. H. U. Yang, R. L. Olmon, K. S. Deryckx, **X. G. Xu**, H. A. Bechtel, Y. Xu, B. A. Lail, and M. B. Raschke "Accessing the Optical Magnetic Near-field through Babinet's Principle." *ACS Photonics* 1, 9, 894, **2014**
6. **X. G. Xu**, A. E. Tanur, and G. C. Walker "Phase Controlled Homodyne Infrared Near-field Microscopy Reveal Inhomogeneity within and among Individual Boron Nitride Nanotubes " *Journal of Physical Chemistry A* 117, 6, 3348, **2013** (featured in cover)
7. S. Pirotta, **X. G. Xu**; A. Delfan, S. Mysore, S. Maiti, G. Dacarro, M. Patrini, M. Galli, G. Guizzetti, D. Bajoni, J. Sipe, G. C. Walker, and M. Liscidini "Surface Enhanced Raman Scattering in Purely Dielectric Structures via Bloch Surface Waves" *Journal of Physical Chemistry C* 117, 13, 6821, **2013**
8. **X. G. Xu**, and M. B. Raschke "Near-field Infrared Vibrational Dynamics and Tip-Enhanced Decoherence " *Nano Letters* 13, 4, 1588, **2013**

9. **X. G. Xu**, M. Rang, I. M. Craig and M. B. Raschke "Pushing the Sample Size Limit of Infrared Vibrational Nanospectroscopy: From Monolayer towards Single Molecule Sensitivity " *Journal of Physical Chemistry Letters* 3, 13, 1836, **2012**
10. S. Berwenger, J. Atkins, **X. G. Xu**, R. L. Olmon, and M. B. Raschke " Ultrafast Nano-focusing with Full Optical Waveform Control " *Nano Letters* 11, 10, 4309, **2011**
11. A. Anderson, K. S. Deryckx, **X. G. Xu**, G. Steinmeyer and M. B. Raschke "Few-Femtosecond Plasmon Dephasing of a Single Metallic Nanostructure from Optical Response Function Reconstruction by Interferometric Frequency Resolved Optical Gating" *Nano Letters* 10, 7, 2519, **2010**
12. S. O. Konorov, **X. G. Xu**, J. W. Hepburn, and V. Milner. "Characterization of transient molecular vibration excited with shaped femtosecond pulses." *Journal of Chemical Physics* 130, 234505, **2009**
13. S. O. Konorov, **X. G. Xu**, J. W. Hepburn, and V. Milner "Narrowband Spectroscopy by All-optical Correlation of Broadband pulses." *Phys. Rev. A* 79, 031801, **2009** (rapid communication)
14. **X. G. Xu**, S. O. Konorov, J. W. Hepburn, and V. Milner "Background-free Coherent Raman Spectroscopy by Detecting the Spectral Phase of Molecular Vibrations." *Optics Letters* 33, 11, 1177, **2008**
15. **X. G. Xu**, S. O. Konorov, J. W. Hepburn, and V. Milner. "Noise autocorrelation spectroscopy with coherent Raman scattering." *Nature Physics* 4, 2, 125, **2008**
16. S. O. Konorov, **X. G. Xu**, M. W. Blades, R. B. Turner, J. W. Hepburn, and V. Milner "Pulse optimization for Raman spectroscopy with cross-correlation frequency resolved optical gating." *Optics Express* 15, 12, 7564, **2007**
17. **X. G. Xu**, S. O. Konorov, S. Zhdanovich, J. W. Hepburn, and V. Milner. "Complete characterization of molecular vibration using frequency resolved gating." *Journal of Chemical Physics* 126, 091102, **2007**

CONFERENCE AND
INVITED TALK

1. Poster presenter, 53th Western Spectroscopy association conference, Pacific Grove, CA, USA, Jan. 29 - Feb. 3, 2007.
2. Poster presenter, Gordon Research Conference, Quantum Control of Light and Matter Interaction, Newport, RI, USA, Aug. 12-17, 2007.
3. Oral presentation, 39th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Penn State University, PA, USA. May 27-31, 2008.
4. Oral presentation, Annual Meeting of American Physical Society, Portland, OR, USA, Mar. 15-19, 2010.
5. Oral presentation, Frontier in Optics/CLEO, San Jose, CA, USA, Oct. 16-20, 2011.
6. Oral presentation, Chemical Biophysics Symposium, Toronto, Ontario, Canada, Apr. 19, 2013.
7. Poster presenter, 6th International Conference on Surface Plasmon Photonics Ottawa, Ontario, Canada, May 26-31, 2013.
8. Oral presentation, American Chemical Society Fall Meeting, Indianapolis, IN, USA, Sep. 8-12, 2013.
9. Invited talk, Materials Science and Technology 2013, Montreal, Quebec, Canada, Oct. 27-31, 2013.
10. Poster presenter, Nano Ontario Conference, Kingston, Ontario, Canada, Nov. 7-8, 2013.
11. Oral Presentation, International Conference on Scanning Probe Microscopy on Soft and Polymeric Materials conference, Toronto, Ontario, Canada, Sept. 2-6, 2014.
12. Invited colloquium talk, Department of Physics, West Virginia University, Morgantown, WV, USA, Feb. 12, 2015.
13. Oral presentation, Annual Meeting of American Physical Society, San Antonio, TX, USA, Mar. 2-6, 2015
14. Invited colloquium talk, Department of Physics, Boston College, Boston, MA, USA, Mar.

- 9, 2016.
15. Oral presentation, American Chemical Society Fall Meeting, Philadelphia, PA, USA, Aug. 21-25, 2016
 16. Invited seminar talk, Department of Chemistry and Environmental Sciences, New Jersey Institute of Technology, Newark, NY, USA, Oct. 4, 2016.
 17. Invited presentation, American Chemical Society Fall Meeting, San Francisco, CA, USA, Apr. 2, 2017.
 18. Invited presentation , FACSS SCIX2017 Conference, Reno, NV, USA. Oct. 8-13, 2017
 19. Invited presentation, Future Directions in Photonics and Phononics, Workshop, Sanya, Hainan, China, Dec. 13, 2017.
 20. Invited seminar, Department of Chemistry, Xiamen University, Xiamen, Fujian, China, Dec. 14, 2017
 21. Invited seminar, School of Physical Science and Technology, ShanghaiTech University, Shanghai, China, Dec. 16, 2017.
 22. Invited seminar, Institute of Functional and Soft Materials, Soochow University, Suzhou, Jiangsu, China, Dec. 18, 2017.
 23. Invited seminar, College of Chemistry and Molecular Engineering, Peking University, Beijing, China, Dec. 22, 2017.
 24. Invited seminar, Department of Chemistry and Biochemistry, University of Delaware, Newark, DE, USA, May 9, 2018.
 25. Oral presentation, PittCon2018 Conference, Orlando, FL, USA, Feb. 26, 2018.
 26. Poster presentation, Beckman Symposium, Irvine, CA, USA, Aug. 12-14, 2018.
 27. Invited presentation, American Chemical Society Fall Meeting, Boston, MA, USA. Aug. 19, 2018. This presentation was featured by C&EN news as a "must see" presentation.
 28. Invited lecture, International Conference on Scanning Probe Microscopy on Soft and Polymeric Materials conference, Leuven, Belgium Aug. 21-24, 2018.
 29. Oral presentation, 15th International Conference of Near-field Optics and Nanophotonics (NFO-15), Troyes, France, Aug. 26, 2018.
 30. Oral presentation, Optical Scanning Probe Microscopy of 2D Quantum Materials, Harvard University, Cambridge, MA, USA, Oct. 18, 2018.
 31. Oral presentation, PittCon2019 Conference, Philadelphia, PA, USA, Mar. 17-21, 2019.
 32. Invited seminar, Department of Material Sciences, Xi'an Jiaotong University, Xi'an, China, May. 27, 2019.
 33. Invited talk, Northeast Regional Meeting of American chemical Society, Saratoga Springs, NY, USA, Jun. 23-26, 2019.
 34. Invited seminar, Material Research Institute, Pennsylvania State University, College Park, PA, USA, Jul. 22, 2019.
 35. Invited presentation, American Chemical Society Fall Meeting, San Diego, CA, USA. Aug. 23-27, 2019.
 36. Invited seminar, Department of Chemistry, University of Pennsylvania, Philadelphia, PA, USA, Sept. 5, 2019.
 37. Invited presentation , FACSS SCIX2019 Conference, Palm Springs, CA, USA. Oct. 13-18, 2019.
 38. Invited seminar, Department of Chemistry, Indiana University, Bloomington, IN, USA, Oct. 29, 2019
 39. Keynote presentation, The 7th International Conference on Tip-Enhanced Raman Spectroscopy, Xiamen, Fujian, China. Nov. 9-12, 2019.
 40. Invited presentation , Advanced Chemical Microscopy for Life Science and Translational Medicine, SPIE Photonics West Conference, San Francisco, CA, USA. Feb. 1-6, 2020.
 41. Invited presentation, Microscopy and Microanalysis Meeting 2020, Milwaukee, WI, USA, Aug.2-6, (online)
 42. Oral presentation, NanoScientific Forum Europe 2020, scanning probe microscopy, Dublin, Ireland, Sept. 23 - 25, 2020 (online).
 43. Invited seminar, Department of Chemistry, University of Washington, Seattle, WA. Feb.

- 8, 2021 (online)
44. Invited seminar, Department of Physics and Astronomy, Stony Brook University, Stony Brook, NY, USA, Apr. 2. 2021 (online)
 45. Invited colloquium, Department of Chemistry, University of British Columbia, Okanagan, British Columbia, Canada. Apr. 6, 2021. (online)
 46. Invited presentation, Material Research Society 2021 MRS Spring Meeting and Exhibit, Seattle, Washington, Apr. 18-23 2021. (online)
 47. Invited presentation , Enhanced Spectroscopies and Nanoimaging 2021, SPIE Optical + Photonics Meeting, San Diego, CA, USA. Aug. 1-5, 2021 (scheduled)
 48. Invited Presentation, FACSS SCIX2021 Conference, Providence, RI, USA. Sept. 26 to Oct. 1, 2021 (scheduled)
 49. Invited presentation, Material Research Society 2021 MRS Fall Meeting and Exhibit, Boston,MA, Nov. 28- Dec. 3 2021 (scheduled)

CURRENT AND
FORMER STUDENTS
AND
POSTDOCTORAL
FELLOWS

Current graduate student(s) under supervision: Devon Jakob, Joseph González-Fialkowski, Qing Xie

Past graduate student(s): Michael E. Goodrich, Le Wang, Haomin Wang

Past undergraduate student(s): Yiyuan Zhang, Paul Brasavage, Siuling Pau-Sanchez, Jiawei Liu, Haoluo Fu, and Yumin Tian

PROFESSIONAL
MEMBERSHIPS

- Member, American Chemical Society
- Member, Material Research Society
- Member, Society of Photo-Optical Instrumentation Engineers

PROFESSIONAL
ACTIVITIES

- Guest editor for *Chemical Society Review* on special issue of Nanospectroscopy
- Reviewer for *Analytical Chemistry*, *Nature Nanotechnology*, *Nature Communications*, *Science Advances*, *Chemical Science*, *Communications Biology*, *Journal of Physical Chemistry A/C/Letters*, *Energy & Fuel*, *Advanced Materials*, *Advanced Function Materials*, *Advanced Optical Materials*, *2D Materials*, *Journal of Physical Chemistry*, *Nanoscale*, *Nano Letters*, *NanoPhotonics*, *Small*, *Environmental Science and Technology*, *Material Research Express*, *Optics Material Express*, *Journal of Applied Physics*, *Light Sciences and Applications*, *Laser & Photonics Reviews*, *Langmuir*, *ACS Photonics*, *ACS Applied Nano Materials*, *ACS Central Sciences*, *Sensors*
- Program committee member for *Advanced Chemical Microscopy for Life Science and Translational Medicine*, *SPIE Photonics West Conference*