Stanford

Tony Heinz

Professor of Applied Physics and of Photon Science and, by courtesy, of Electrical Engineering

CONTACT INFORMATION

- **Administrative contact on campus/Ginzton lab**

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Bio

BIO

Tony Heinz is a Professor of Applied Physics and Photon Science at Stanford University and the Director of the Chemical Sciences Division at the SLAC National Accelerator Laboratory. Heinz received a BS degree in Physics from Stanford University and a PhD degree, also in Physics, from the University of California at Berkeley in 1982. Heinz was subsequently at the IBM Research Division in Yorktown Heights, NY until he joined Columbia University in 1995 as a Professor of Electrical Engineering and Physics. At Columbia, he served as the Chair of the Department of Electrical Engineering from 2003 until 2007. He has also served as a Scientific Director of the Columbia Nanoscale Science and Engineering Center (NSEC) and of the Energy Frontier Research Center (EFRC). He was the President of the Optical Society of America in 2012. Heinz joined Stanford University in 2015.

ACADEMIC APPOINTMENTS

- Professor, Applied Physics
- Professor, Photon Science Directorate
- Professor (By courtesy), Electrical Engineering
- Principal Investigator, Stanford Institute for Materials and Energy Sciences

ADMINISTRATIVE APPOINTMENTS

- Associate Laboratory Director, Energy Sciences, SLAC, (2017- present)
- Professor of Applied Physics and Photon Science, Stanford University, (2015- present)
- Director, Chemical Science Division, SLAC National Accelerator Laboratory, (2015-2019)
- David M. Rickey Professor, Columbia University, (2001-2014)
- Professor of Physics and Electrical Engineering, Columbia University, (1995-2000)
- Senior Department Manager, Department Manager, Research Staff Member, IBM Research Division, T. J. Watson Research Center, (1983-1995)

HONORS AND AWARDS

- Frank Isakson Prize, American Physical Society (2014)
- Julius Springer Prize for Applied Physics (with Phaedon Avouris), Springer (2008)

- Great Teacher Award, Columbia University (2005)
- Alexander von Humboldt Research Award, Alexander von Humboldt-Stiftung Foundation, Germany (1996)
- Ernst Abbe Medal, International Commission for Optics Prize (1995)
- IBM Invention Award, IBM (1994)
- IBM Outstanding Technical Achievement Award, IBM (1992)
- IBM Graduate Fellow, University of California, Berkeley (1982-83)
- National Science Foundation Graduate Fellow, University of California, Berkeley (1978-81)
- Levine Award for Outstanding Studies in Physics, Stanford University (1978)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Scientific Advisory Boards, Fritz-Haber Institute, Berlin; Max-Born Institute, Berlin (2014 - present)
- Editor, North America, 2D Materials journal, The Institute of Physics (2014 - 2018)
- Chair, Subcommittee on Optics and Photonics, NSF Dir. of Math and Physical Science (2013 - 2015)
- President, Optical Society of America (2012 - 2012)
- Chair, Scientific Advisory Board, Center for Integrated Nanotechnologies, Sandia National Laboratories (2011 - 2017)
- Chair, Gordon Conference on Ultrafast Dynamics of Cooperative Phenomena (2010 - 2010)
- Scientific Director, DOE Energy Frontier Research Center at Columbia (EFRC) (2009 - 2014)
- Scientific Director, NSF Nanoscale Science & Engineering Center at Columbia (2006 - 2012)
- Chair, Board of Editors, Optical Society of America (2006 - 2009)
- Chair, International Conference on Quantum Electronics (IQEC) (2002 - 2002)
- Chair, Division of Laser Science, American Physical Society (2001 - 2002)
- Chair, Review Panel, Optical Technology Division, Physics Laboratory, National Institute of Standards and Technology (NIST) (2000 - 2005)
- Director, Adriatico Symposium on Laser Applications in Science, Abdus Salam International Centre for Theoretical Physics (ICTP) (2000 - 2000)
- Chair, Quantum Electronics and Laser Science Conference (QELS) (1995 - 1995)
- Editor, Journal of the Optical Society of America B (JOSA B) (1994 - 2000)

PROFESSIONAL EDUCATION

- B.S. (with Distinction), Stanford University , Physics (1978)
- Ph.D., University of California, Berkeley , Physics (1982)

LINKS

- Heinz group website: http://heinz.stanford.edu
- Stanford PULSE Institute website: http://ultrafast.stanford.edu
- Ginzton Laboratory website: http://ginzton.stanford.edu
- SIMES - Stanford Institute for Materials and Energy Sciences: http://simes.stanford.edu/
- Stanford Dept. of Applied Physics: http://web.stanford.edu/dept/app-physics/
- SLAC National Accelerator Laboratory: http://slac.stanford.edu

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Heinz's research has centered on the elucidation of the properties and dynamics of nanoscale materials through the application of a wide range of optical spectroscopies. His research on surfaces, interfaces, and nanoscale materials, such as carbon nanotubes, graphene and other 2D materials, has been recognized by Optics Prize of the International Commission for Optics, a Research Award of the von Humboldt Foundation, the Julius Springer Prize for Applied Physics, and the Isakson Prize of the American Physical Society.

Teaching

COURSES

2018-19

- Lasers: EE 236C (Spr)

2017-18

- Lasers: EE 236C (Spr)
- Modern Physics for Engineers: EE 65 (Spr)

2016-17

- Lasers: EE 236C (Spr)

2015-16

- Experimental Techniques in Condensed Matter Physics: APPPHYS 302 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Alexandre Gauthier, Evan Wang

Postdoctoral Faculty Sponsor

Henrique Bucker Ribeiro, Jorgen Gladh, Ouri Karni, Eric Yue Ma, Laura Mundt, Lutz Waldecker, Leo Yu

Doctoral Dissertation Advisor (AC)

Elyse Barre, Minda Deng, Aidan O'Beirne

Doctoral Dissertation Co-Advisor (AC)

Clara Nyby

Doctoral (Program)

Alexandre Gauthier, Sam Girdzis

Publications

PUBLICATIONS

- **Anisotropic structural dynamics of monolayer crystals revealed by femtosecond surface X-ray scattering** *NATURE PHOTONICS*
  Tung, I., Krishnamoorthy, A., Sadasivam, S., Zhou, H., Zhang, Q., Seyler, K. L., Clark, G., Mannebach, E. M., Nyby, C., Ernst, F., Zhu, D., Glownia, J. M., Kozina, et al
  2019; 13 (6): 425-+

- **Disentangling interface and bulk contributions to high-harmonic emission from solids** *OPTICA*
  Vampa, G., Liu, H., Heinz, T. F., Reis, D. A.

2019; 6 (5): 553–56

- **Zeeman-Induced Valley-Sensitive Photocurrent in Monolayer MoS2** *PHYSICAL REVIEW LETTERS*
  Zhang, X., Lai, Y., Dohner, E., Moon, S., Taniguchi, T., Watanabe, K., Smirnov, D., Heinz, T. F.
  2019; 122 (12)
- **Recording interfacial currents on the subnanometer length and femtosecond time scale by terahertz emission.** *Science advances*
  Ma, E. Y., Guzelturk, B., Li, G., Cao, L., Shen, Z., Lindenberg, A. M., Heinz, T. F.
  2019; 5 (2): eaau0073
- **Spatial Separation of Carrier Spin by the Valley Hall Effect in Monolayer WSe2 Transistors.** *Nano letters*
  Barre, E., Incorvia, J. A., Kim, S. H., McClellan, C. J., Pop, E., Wong, H. P., Heinz, T. F.
  2019
- **Zeeman-Induced Valley-Sensitive Photocurrent in Monolayer MoS_{2}.** *Physical review letters*
  Zhang, X. X., Lai, Y., Dohner, E., Moon, S., Taniguchi, T., Watanabe, K., Smirnov, D., Heinz, T. F.
  2019; 122 (12): 127401
- **An ultrafast symmetry switch in a Weyl semimetal.** *Nature*
  Sie, E. J., Nyby, C. M., Pemmaraju, C. D., Park, S. J., Shen, X., Yang, J., Hoffmann, M. C., Ofori-Okai, B. K., Li, R., Reid, A. H., Weathersby, S., Mannebach, E., Finney, et al
  2019; 565 (7737): 61–66
- **Ultrafast dynamics in van der Waals heterostructures.** *Nature nanotechnology*
  Jin, C., Ma, E. Y., Karni, O., Regan, E. C., Wang, F., Heinz, T. F.
  2018; 13 (11): 994–1003
- **Resolving Hysteresis in Perovskite Solar Cells with Rapid Flame-Processed Cobalt-Doped TiO2** *ADVANCED ENERGY MATERIALS*
  Kim, J., Chai, S., Ji, Y., Levy-Wendt, B., Kim, S., Yi, Y., Heinz, T. F., Norskov, J. K., Park, J., Zheng, X.
  2018; 8 (29)
- **Enhancement of Exciton-Phonon Scattering from Monolayer to Bilayer WS2** *NANO LETTERS*
  Raja, A., Selig, M., Berghauser, G., Yu, J., Hill, H. M., Rigosi, A. F., Brus, L. E., Knorr, A., Heinz, T. F., Malic, E., Chernikov, A.
  2018; 18 (10): 6135–43
- **Strain tuning of excitons in monolayer WSe2** *PHYSICAL REVIEW B*
  Aslan, O., Deng, M., Heinz, T. F.
  2018; 98 (11)
- **Efficient generation of neutral and charged biexcitons in encapsulated WSe2 monolayers.** *Nature communications*
  Ye, Z., Waldecker, L., Ma, E. Y., Rhodes, D., Antony, A., Kim, B., Zhang, X., Deng, M., Jiang, Y., Lu, Z., Smirnov, D., Watanabe, K., Taniguchi, et al
  2018; 9 (1): 3718
- **Efficient generation of neutral and charged biexcitons in encapsulated WSe2 monolayers** *NATURE COMMUNICATIONS*
  Ye, Z., Waldecker, L., Ma, E., Rhodes, D., Antony, A., Kim, B., Zhang, X., Deng, M., Jiang, Y., Lu, Z., Smirnov, D., Watanabe, K., Taniguchi, et al
  2018; 9
- **Controlling the electronic properties of 2D semiconductors by the external environment**
  Heinz, T.
  AMER CHEMICAL SOC.2018
- **Colloquium: Excitons in atomically thin transition metal dichalcogenides** *REVIEWS OF MODERN PHYSICS*
  Wang, G., Chernikov, A., Glazov, M. M., Heinz, T. F., Marie, X., Amand, T., Urbaszek, B.
  2018; 90 (2)
- **Optical Imaging and Spectroscopic Characterization of Self-Assembled Environmental Adsorbates on Graphene** *NANO LETTERS*
  Gallagher, P., Li, Y., Watanabe, K., Taniguchi, T., Heinz, T. F., Goldhaber-Gordon, D.
  2018; 18 (4): 2603–8
- **Probing the Optical Properties and Strain-Tuning of Ultrathin Mo1-&ITx&ITW&ITx&ITTe2** *NANO LETTERS*
  Aslan, O., Datye, I. M., Mleczko, M. J., Cheung, K., Krylyuk, S., Bruma, A., Kalish, I., Davydov, A. V., Pop, E., Heinz, T. F.

2018; 18 (4): 2485–91

- **Two-dimensional models for the optical response of thin films** *2D MATERIALS*
  Li, Y., Heinz, T. F.
  2018; 5 (2)
- **Enhancing Mo:BiVO4 Solar Water Splitting with Patterned Au Nanospheres by Plasmon-Induced Energy Transfer** *ADVANCED ENERGY MATERIALS*
  Kim, J., Shi, X., Jeong, M., Park, J., Han, H., Kim, S., Guo, Y., Heinz, T. F., Fan, S., Lee, C., Park, J., Zheng, X.
  2018; 8 (5)
- **Ultrafast Graphene Light Emitters** *NANO LETTERS*
  Kim, Y., Gao, Y., Shiue, R., Wang, L., Aslan, O., Bae, M., Kim, H., Seo, D., Choi, H., Kim, S., Nemilentsau, A., Low, T., Tan, et al
  2018; 18 (2): 934–40
- **Imaging CF3I conical intersection and photodissociation dynamics with ultrafast electron diffraction** *Science*
  Yang, J., Zhu, X., Wolf, T. J., Li, Z., Nunes, J. F., Coffee, R., Cryan, J. P., Gühr, M., Hegazy, K., Heinz, T. F., Jobe, K., Li, R., Shen, et al
  2018; 361 (6397): 64-67
- **Imaging CF3I conical intersection and photodissociation dynamics with ultrafast electron diffraction.** *Science (New York, N.Y.)*
  Yang, J., Zhu, X., Wolf, T. J., Li, Z., Nunes, J. P., Coffee, R., Cryan, J. P., Gühr, M., Hegazy, K., Heinz, T. F., Jobe, K., Li, R., Shen, et al
  2018; 361 (6397): 64–67
- **Temperature-Dependent Thermal Boundary Conductance of Monolayer MoS2 by Raman Thermometry** *ACS APPLIED MATERIALS & INTERFACES*
  Yalon, E., Aslan, O., Smithe, K. H., McClellan, C. J., Suryavanshi, S. V., Xiong, F., Sood, A., Neumann, C. M., Xu, X., Goodson, K. E., Heinz, T. F., Pop, E.
  2017; 9 (49): 43013–20
- **Magnetic brightening and control of dark excitons in monolayer WSe2** *NATURE NANOTECHNOLOGY*
  Zhang, X., Cao, T., Lu, Z., Lin, Y., Zhang, F., Wang, Y., Li, Z., Hone, J. C., Robinson, J. A., Smirnov, D., Louie, S. G., Heinz, T. F.
  2017; 12 (9): 883-+
- **Coulomb engineering of the bandgap and excitons in two-dimensional materials** *NATURE COMMUNICATIONS*
  Raja, A., Chaves, A., Yu, J., Arefe, G., Hill, H. M., Rigosi, A. F., Berkelbach, T. C., Nagler, P., Schueller, C., Korn, T., Nuckolls, C., Hone, J., Brus, et al
  2017; 8
- **Local Polar Fluctuations in Lead Halide Perovskite Crystals** *PHYSICAL REVIEW LETTERS*
  Yaffe, O., Guo, Y., Tan, L. Z., Egger, D. A., Hull, T., Stoumpos, C. C., Zheng, F., Heinz, T. F., Kronik, L., Kanatzidis, M. G., Owen, J. S., Rappe, A. M., Pimenta, et al
  2017; 118 (13)
- **High-harmonic generation from an atomically thin semiconductor** *NATURE PHYSICS*
  Liu, H., Li, Y., You, Y. S., Ghimire, S., Heinz, T. F., Reis, D. A.
  2017; 13 (3): 262-?
- **after Ultrafast Excitation.** *Nano letters*
  Ruppert, C., Chernikov, A., Hill, H. M., Rigosi, A. F., Heinz, T. F.
  2017; 17 (2): 644-651
- **Polaritons in layered two-dimensional materials** *NATURE MATERIALS*
  Low, T., Chaves, A., Caldwell, J. D., Kumar, A., Fang, N. X., Avouris, P., Heinz, T. F., Guinea, F., Martin-Moreno, L., Koppens, F.
  2017; 16 (2): 182-194
- **The Role of Electronic and Phononic Excitation in the Optical Response of Monolayer WS2 after Ultrafast Excitation** *NANO LETTERS*
  Ruppert, C., Chernikov, A., Hill, H. M., Rigosi, A. F., Heinz, T. F.
  2017; 17 (2): 644-651
- **Optical manipulation of valley pseudospin** *NATURE PHYSICS*
  Ye, Z., Sun, D., Heinz, T. F.
  2017; 13 (1): 26-29
- **2D Materials Properties and Devices Introduction** *2D MATERIALS: PROPERTIES AND DEVICES*
  Avouris, P., Heinz, T. F., Low, T., Avouris, P., Heinz, T., Low, T.

2017: 1–4

- **2D Materials: Properties and Devices** *2D MATERIALS: PROPERTIES AND DEVICES*
  Avouris, P., Heinz, T. F., Low, T.
  2017: 1–504

- **Dynamic Optical Tuning of Interlayer Interactions in the Transition Metal Dichalcogenides.** *Nano letters*
  Mannebach, E. M., Nyby, C., Ernst, F., Zhou, Y., Tolsma, J., Li, Y., Sher, M. J., Tung, I. C., Zhou, H., Zhang, Q., Seyler, K. L., Clark, G., Lin, et al
  2017; 17 (12): 7761–66

- **High-order harmonics from bulk and 2D crystals**
  You, Y., Ndabashimiye, G., Liu, H., Li, Y., Heinz, T. F., Reis, D. A., Ghimire, S., IEEE
  IEEE.2017

- **Excitonic linewidth and coherence lifetime in monolayer transition metal dichalcogenides.** *Nature communications*
  Selig, M., Berghäuser, G., Raja, A., Nagler, P., Schüller, C., Heinz, T. F., Korn, T., Chernikov, A., Malic, E., Knorr, A.
  2016; 7: 13279-?

- **Electronic band gaps and exciton binding energies in monolayer MoxW1-xS2 transition metal dichalcogenide alloys probed by scanning tunneling and optical spectroscopy** *PHYSICAL REVIEW B*
  Rigosi, A. F., Hill, H. M., Rim, K. T., Flynn, G. W., Heinz, T. F.
  2016; 94 (7)

- **Metal-Semiconductor Nanoparticle Hybrids Formed by Self-Organization: A Platform to Address Exciton-Plasmon Coupling.** *Nano letters*
  Strelow, C., Theuerholz, T. S., Schmidtke, C., Richter, M., Merkl, J., Kloust, H., Ye, Z., Weller, H., Heinz, T. F., Knorr, A., Lange, H.
  2016; 16 (8): 4811-4818

- **Band Alignment in MoS2/WS2 Transition Metal Dichalcogenide Heterostructures Probed by Scanning Tunneling Microscopy and Spectroscopy.** *Nano letters*
  Hill, H. M., Rigosi, A. F., Rim, K. T., Flynn, G. W., Heinz, T. F.
  2016; 16 (8): 4831-4837

- **Energy Transfer from Quantum Dots to Graphene and MoS2: The Role of Absorption and Screening in Two-Dimensional Materials.** *Nano letters*
  Raja, A., Montoya Castillo, A., Zultak, J., Zhang, X., Ye, Z., Roquelet, C., Chenet, D. A., van der Zande, A. M., Huang, P., Jockusch, S., Hone, J., Reichman, D. R., Brus, et al
  2016; 16 (4): 2328-2333

- **Ultrasensitive Plasmonic Detection of Molecules with Graphene** *ACS PHOTONICS*
  Farmer, D. B., Avouris, P., Li, Y., Heinz, T. F., Han, S.
  2016; 3 (4): 553-557

- **Linearly Polarized Excitons in Single- and Few-Layer ReS2 Crystals** *ACS PHOTONICS*
  Aslan, O. B., Chenet, D. A., van der Zande, A. M., Hone, J. C., Heinz, T. F.
  2016; 3 (1): 96-101

- **Experimental Evidence for Dark Excitons in Monolayer WSe2** *PHYSICAL REVIEW LETTERS*
  Zhang, X., You, Y., Zhao, S. Y., Heinz, T. F.
  2015; 115 (25)

- **Measurement of Lateral and Interfacial Thermal Conductivity of Single- and Bilayer MoS2 and MoSe2 Using Refined Optothermal Raman Technique.** *ACS applied materials & interfaces*
  Zhang, X., Sun, D., Li, Y., Lee, G., Cui, X., Chenet, D., You, Y., Heinz, T. F., Hone, J. C.
  2015; 7 (46): 25923-25929

- **Tunable electronic correlation effects in nanotube-light interactions** *PHYSICAL REVIEW B*
  Miyauchi, Y., Zhang, Z., Takekoshi, M., Tomio, Y., Suzuura, H., Perebeinos, V., Deshpande, V. V., Lu, C., Berciaud, S., Kim, P., Hone, J., Heinz, T. F.
  2015; 92 (20)

- **Photonic and Plasmonic Guided Modes in Graphene-Silicon Photonic Crystals** *ACS PHOTONICS*
  Gu, T., Andryieuski, A., Hao, Y., Li, Y., Hone, J., Wong, C. W., Lavrinenko, A., Low, T., Heinz, T. F.
  2015; 2 (11): 1552-1558

- **Impedance spectroscopy studies of moisture uptake in low-k dielectrics and its relation to reliability** *MICROELECTRONIC ENGINEERING*
  Raja, A., Laibowitz, R., Liniger, E. G., Shaw, T. M., Heinz, T. F.
  2015; 147: 100-103

- **Dynamic Structural Response and Deformations of Monolayer MoS2 Visualized by Femtosecond Electron Diffraction** *NANO LETTERS*
  Mannebach, E. M., Li, R., Duerloo, K., Nyby, C., Zalden, P., Vecchione, T., Ernst, F., Reid, A. H., Chase, T., Shen, X., Weathersby, S., Hast, C., Hettel, et al
  2015; 15 (10): 6889-6895

- **Electrical Tuning of Exciton Binding Energies in Monolayer WS2** *PHYSICAL REVIEW LETTERS*
  Chernikov, A., van der Zande, A. M., Hill, H. M., Rigosi, A. F., Velauthapillai, A., Hone, J., Heinz, T. F.
  2015; 115 (12)

- **In-Plane Anisotropy in Mono- and Few-Layer ReS2 Probed by Raman Spectroscopy and Scanning Transmission Electron Microscopy** *NANO LETTERS*
  Chenet, D. A., Aslan, O. B., Huang, P. Y., Fan, C., van der Zande, A. M., Heinz, T. F., Hone, J. C.
  2015; 15 (9): 5667-5672

- **Probing Interlayer Interactions in Transition Metal Dichalcogenide Heterostructures by Optical Spectroscopy: MoS2/WS2 and MoSe2/WSe2** *NANO LETTERS*
  Rigos, A. F., Hill, H. M., Li, Y., Chernikov, A., Heinz, T. F.
  2015; 15 (8): 5033-5038

- **Probing the Dynamics of the Metallic-to-Semiconducting Structural Phase Transformation in MoS2 Crystals** *NANO LETTERS*
  Guo, Y., Sun, D., Ouyang, B., Raja, A., Song, J., Heinz, T. F., Brus, L. E.
  2015; 15 (8): 5081-5088

- **Bright visible light emission from graphene** *NATURE NANOTECHNOLOGY*
  Kim, Y. D., Kim, H., Cho, Y., Ryoo, J. H., Park, C., Kim, P., Kim, Y. S., Lee, S., Li, Y., Park, S., Yoo, Y. S., Yoon, D., Dorgan, et al
  2015; 10 (8): 676-681

- **Excitons in ultrathin organic-inorganic perovskite crystals** *PHYSICAL REVIEW B*
  Yaffe, O., Chernikov, A., Norman, Z. M., Zhong, Y., Velauthapillai, A., van der Zande, A., Owen, J. S., Heinz, T. F.
  2015; 92 (4)

- **Population inversion and giant bandgap renormalization in atomically thin WS2 layers** *NATURE PHOTONICS*
  Chernikov, A., Ruppert, C., Hill, H. M., Rigosi, A. F., Heinz, T. F.
  2015; 9 (7): 466-U69

- **Observation of Ground- and Excited-State Charge Transfer at the C-60/Graphene Interface** *ACS NANO*
  Jnawali, G., Rao, Y., Beck, J. H., Petrone, N., Kymissis, I., Hone, J., Heinz, T. F.
  2015; 9 (7): 7175-7185

- **Observation of biexcitons in monolayer WSe2** *NATURE PHYSICS*
  You, Y., Zhang, X., Berkelbach, T. C., Hybertsen, M. S., Reichman, D. R., Heinz, T. F.
  2015; 11 (6): 477-U138

- **Observation of Excitonic Rydberg States in Monolayer MoS2 and WS2 by Photoluminescence Excitation Spectroscopy** *NANO LETTERS*
  Hill, H. M., Rigosi, A. F., Roquelet, C., Chernikov, A., Berkelbach, T. C., Reichman, D. R., Hybertsen, M. S., Brus, L. E., Heinz, T. F.
  2015; 15 (5): 2992-2997

- **Valley Splitting and Polarization by the Zeeman Effect in Monolayer MoSe2** *PHYSICAL REVIEW LETTERS*
  Li, Y., Ludwig, J., Low, T., Chernikov, A., Cui, X., Arefe, G., Kim, Y. D., van der Zande, A. M., Rigosi, A., Hill, H. M., Kim, S. H., Hone, J., Li, et al
  2014; 113 (26)

- **Measurement of the optical dielectric function of monolayer transition-metal dichalcogenides: MoS2, MoSe2, WS2, and WSe2** *PHYSICAL REVIEW B*
  Li, Y., Chernikov, A., Zhang, X., Rigosi, A., Hill, H. M., van der Zande, A. M., Chenet, D. A., Shih, E., Hone, J., Heinz, T. F.
  2014; 90 (20)

- **Spectroscopic Study of Anisotropic Excitons in Single Crystal Hexacene** *JOURNAL OF PHYSICAL CHEMISTRY LETTERS*
  Chernikov, A., Yaffe, O., Kumar, B., Zhong, Y., Nuckolls, C., Heinz, T. F.
  2014; 5 (21): 3632-3635

- **Evolution of the Raman spectrum of graphene grown on copper upon oxidation of the substrate** *NANO RESEARCH*
  Yin, X., Li, Y., Ke, F., Lin, C., Zhao, H., Gan, L., Luo, Z., Zhao, R., Heinz, T. F., Hu, Z.
  2014; 7 (11): 1613-1622

- **Optical Properties and Band Gap of Single- and Few-Layer MoTe2 Crystals** *NANO LETTERS*
  Ruppert, C., Aslan, O. B., Heinz, T. F.
  2014; 14 (11): 6231-6236

- **Piezoelectricity of single-atomic-layer MoS2 for energy conversion and piezotronics** *NATURE*
  Wu, W., Wang, L., Li, Y., Zhang, F., Lin, L., Niu, S., Chenet, D., Zhang, X., Hao, Y., Heinz, T. F., Hone, J., Wang, Z. L.
  2014; 514 (7523): 470-?

- **Observation of Rapid Exciton-Exciton Annihilation in Monolayer Molybdenum Disulfide** *NANO LETTERS*
  Sun, D., Rao, Y., Reider, G. A., Chen, G., You, Y., Brezin, L., Harutyunyan, A. R., Heinz, T. F.
  2014; 14 (10): 5625-5629

- **Heterostructures based on inorganic and organic van der Waals systems** *APL MATERIALS*
  Lee, G., Lee, C., van der Zande, A. M., Han, M., Cui, X., Arefe, G., Nuckolls, C., Heinz, T. F., Hone, J., Kim, P.
  2014; 2 (9)

- **Atomically thin p-n junctions with van der Waals heterointerfaces** *NATURE NANOTECHNOLOGY*
  Lee, C., Lee, G., van der Zande, A. M., Chen, W., Li, Y., Han, M., Cui, X., Arefe, G., Nuckolls, C., Heinz, T. F., Guo, J., Hone, J., Kim, et al
  2014; 9 (9): 676-681

- **Exciton Binding Energy and Nonhydrogenic Rydberg Series in Monolayer WS2** *PHYSICAL REVIEW LETTERS*
  Chernikov, A., Berkelbach, T. C., Hill, H. M., Rigosi, A., Li, Y., Aslan, O. B., Reichman, D. R., Hybertsen, M. S., Heinz, T. F.
  2014; 113 (7)

- **Multiphonon Relaxation Slows Singlet Fission in Crystalline Hexacene** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Busby, E., Berkelbach, T. C., Kumar, B., Chernikov, A., Zhong, Y., Hlaing, H., Zhu, X., Heinz, T. F., Hybertsen, M. S., Sfeir, M. Y., Reichman, D. R., Nuckolls, C., Yaffe, et al
  2014; 136 (30): 10654-10660

- **Tailoring the Electronic Structure in Bilayer Molybdenum Disulfide via Interlayer Twist** *NANO LETTERS*
  van der Zande, A. M., Kunstrnann, J., Chernikov, A., Chenet, D. A., You, Y., Zhang, X., Huang, P. Y., Berkelbach, T. C., Wang, L., Zhang, F., Hybertsen, M. S., Muller, D. A., Reichman, et al
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