

Mikhail A. Kats

University of Wisconsin - Madison
1415 Engineering Drive
Engineering Hall 3441
Madison, WI 53706

Email: mkats@wisc.edu
Website: katsgroup.ece.wisc.edu
Work phone: 608-890-3984

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- EDUCATION**
- Harvard University** **Cambridge, MA**
PhD in Applied Physics (Advisor: Federico Capasso) February 2014
SM in Applied Physics May 2010
- Cornell University** **Ithaca, NY**
BS in Engineering Physics, with Honors May 2008
- EMPLOYMENT**
- University of Wisconsin - Madison** **Madison, WI**
Assistant Professor January 2015 – present
Electrical and Computer Engineering (primary affiliation)
Materials Science and Engineering
Physics
McPherson Eye Research Institute
- Harvard University** **Cambridge, MA**
Postdoctoral Fellow February 2014 – January 2015
- HONORS & AWARDS**
- Office of Naval Research (ONR) Young Investigator (2016)
Forbes “30 under 30” in Science (2016)
Optical Society of America (OSA) Traveling Lecturer (2016)
Grainger Faculty Scholar (2015)
Harvard Graduate Society Merit Fellowship (2013)
National Science Foundation (NSF) Graduate Research Fellowship (2010)
- JOURNAL PUBLICATIONS** **[Total citations > 5500; h-index \geq 29, tracked by Google Scholar; six journal covers]**
- [46] Z. Zhang, F. Zuo, C. Wan, A. Dutta, J. Kim, J. Rensberg, R. Nawrodt, H. H. Park, T. Larrabee, X. Guan, Y. Zhou, S.M. Prokes, C. Ronning, V. M. Shalaev, A. Boltasseva, M. A. Kats, and S. Ramanathan, “Evolution of metallicity in vanadium dioxide by creation of oxygen vacancies”, *Physical Review Applied* 7, 034008 (2017)
- [45] J. C. W. Song and M. A. Kats, “Giant Hall photoconductivity in narrow-gapped Dirac materials”, *Nano Letters* 16, 7346 (2016).
- [44] M. A. Kats and F. Capasso, “Optical absorbers based on strong interference in ultra-thin films”, *Laser and Photonics Reviews* 10, 735 (2016) [featured on journal cover]
- [43] J. Rensberg, S. Zhang, Y. Zhou, A. S. McLeod, C. Schwarz, M. Goldflam, M. Liu, J. Kerbusch, R. Nawrodt, S. Ramanathan, D. N. Basov, F. Capasso, C. Ronning, and M. A. Kats, “Active Optical Metasurfaces Based on Defect-Engineered Phase-Transition Materials”, *Nano Letters* 16, 1050 (2016)
- [42] M. Khorasaninejad, F. Aieta, P. Kanhaiya, M. A. Kats, P. Genevet, D. Rousso, and F. Capasso, “Achromatic metasurface lens at telecommunications wavelengths”, *Nano Letters* 15, 5358 (2015)
- [41] B. J. Bohn, M. Schnell, M. A. Kats, F. Aieta, R. Hillenbrand, and F. Capasso, “Near-Field Imaging of Phased Array Metasurfaces”, *Nano Letters* 15, 3851 (2015)
- [40] F. Aieta, M. A. Kats, P. Genevet, and F. Capasso, “Multiwavelength achromatic metasurfaces by dispersive phase compensation”, *Science* 347, 1342 (2015)
- [39] S. Zhang, M. A. Kats, Y. Cui, Y. Zhou, Y. Yao, S. Ramanathan, and F. Capasso, “Current-modulated optical properties of vanadium dioxide thin films in the phase transition region”, *Applied Physics Letters* 105, 211104 (2014)

- [38] Y. Yao, R. Shankar, M. A. Kats, Y. Song, J. Kong, M. Loncar, and F. Capasso, “Electrically Tunable Metasurface Perfect Absorbers for Ultrathin Mid-Infrared Optical Modulators”, *Nano Letters* 14, 6526 (2014)
- [37] M. A. Kats and F. Capasso, “Ultra-thin optical interference coatings on rough and flexible substrates”, *Applied Physics Letters* 105, 131108 (2014)
- [36] Y. Yao, M. A. Kats, R. Shankar, Y. Song, J. Kong, M. Loncar, and F. Capasso, “Wide wavelength tuning of optical antennas on graphene with nanosecond response time”, *Nano Letters* 14, 214 (2014)
- [35] M. A. Kats, R. Blanchard, S. Ramanathan, and F. Capasso, “Thin-Film Interference in Lossy, Ultra-Thin Layers”, *Optics and Photonics News*, January (2014)
- [34] H. Gudjonson, M. A. Kats, K. Liu, Z. Nie, E. Kumacheva, and F. Capasso, “Accounting for inhomogeneous broadening in nano-optics by electromagnetic modeling based on Monte Carlo methods”, *Proceedings of the National Academy of Sciences* 111, E639 (2014)
- [33] F. Aieta, P. Genevet, M. A. Kats, and F. Capasso, “Aberrations of flat lenses and aplanatic metasurfaces”, *Optics Express* 21, 31530 (2013)
- [32] M. A. Kats, R. Blanchard, S. Zhang, P. Genevet, C. Ko, S. Ramanathan, and F. Capasso, “Vanadium dioxide as a natural disordered metamaterial: perfect thermal emission and large broadband negative differential thermal emittance”, *Physical Review X* 3, 041004 (2013)
- [31] D. Woolf, M. A. Kats, and F. Capasso, “Spoof surface plasmon waveguide forces”, *Optics Letters* 39, 517 (2014)
- [30] J. Lin, P. Genevet, M. A. Kats, N. Antoniou, and F. Capasso, “Nanostructured holograms for broadband manipulation of vector beams”, *Nano Letters* 13, 4269 (2013)
- [29] M. A. Kats, S. Byrnes, R. Blanchard, M. Kolle, P. Genevet, J. Aizenberg, and F. Capasso, “Enhancement of the color contrast in ultra-thin highly-absorbing optical coatings”, *Applied Physics Letters* 103, 101104 (2013)
- [28] R. Blanchard, T. S. Mansuripur, B. Gokden, N. Yu, M. Kats, P. Genevet, K. Fujita, T. Edamura, M. Yamanishi, and F. Capasso, “High-power low-divergence tapered quantum cascade lasers with plasmonic collimators”, *Applied Physics Letters* 102, 191114 (2013)
- [27] P. Genevet, J. Dellinger, R. Blanchard, A. She, M. Petit, B. Cluzel, M. A. Kats, F. De Fornel, and F. Capasso, “Generation of two-dimensional plasmonic bottle beams”, *Optics Express* 21, 10295 (2013)
- [26] Y. Yao, M. A. Kats, P. Genevet, N. Yu, Y. Song, J. Kong, and F. Capasso, “Broad electrical tuning of graphene-loaded plasmonic antenna”, *Nano Letters* 13, 1257 (2013)
- [25] N. Yu, P. Genevet, F. Aieta, M. A. Kats, R. Blanchard, G. Aoust, J.-P. Tetienne, Z. Gaburro, and F. Capasso, “Flat optics: controlling wavefronts with optical antenna metasurfaces”, *IEEE Selected Topics in Quantum Electronics* 19, 4700423 (2013)
- [24] M. A. Kats, R. Blanchard, P. Genevet, J. Lin, D. Sharma, Z. Yang, M. M. Qazilbash, D. Basov, S. Ramanathan, and F. Capasso, “Thermal tuning of mid-infrared plasmonic antenna arrays using a phase change material”, *Optics Letters* 38, 368 (2013)
- [23] P. Genevet, J. Lin, M. A. Kats, F. Capasso, “Holographic detection of the orbital angular momentum of light with plasmonic photodiodes”, *Nature Communications* 3, 1278 (2012)
- [22] F. Aieta, A. Kabiri, P. Genevet, N. Yu, M. A. Kats, Z. Gaburro, and F. Capasso, “Reflection and refraction of light from metasurfaces with phase discontinuities”, *Journal of Nanophotonics* 6, 0 (2012)
- [21] N. Yu, F. Aieta, P. Genevet, M. A. Kats, Z. Gaburro, F. Capasso, “A broadband, background-free quarter-wave plate based on plasmonic metasurfaces”, *Nano Letters* 12, 6328 (2012).
- [20] M. A. Kats, D. Sharma, J. Lin, P. Genevet, R. Blanchard, Z. Yang, M. M. Qazilbash, D. Basov, S. Ramanathan, and F. Capasso, “Ultra-thin perfect absorber using a tunable phase change material”, *Applied Physics Letters* 101, 221101 (2012) [featured on journal cover]
- [19] M. A. Kats, R. Blanchard, P. Genevet and F. Capasso, “Nanometre optical coatings based on strong interference effects in highly absorbing media”, *Nature Materials* 12, 20 (2013); published online in 2012.
- [18] F. Aieta, P. Genevet, M. A. Kats, N. Yu, R. Blanchard, Z. Gaburro, F. Capasso, “Aberration-free ultrathin flat lenses and axicons at telecom wavelengths based on plasmonic metasurfaces”, *Nano Letters* 12, 4932 (2012)
- [17] M. A. Kats, P. Genevet, G. Aoust, N. Yu, R. Blanchard, F. Aieta, Z. Gaburro, and F. Capasso, “Giant birefringence in optical antenna arrays with widely tailorable optical anisotropy”, *Proceedings of the National Academy of Sciences* 109, 12364 (2012)

- [16] R. Blanchard, G. Aoust, P. Genevet, N. Yu, M. A. Kats, Z. Gaburro, F. Capasso, "Modeling nanoscale V-shaped antennas for the design of optical phased arrays", *Physical Review B* 85, 155457 (2012)
- [15] F. Aieta, P. Genevet, N. Yu, M. A. Kats, Z. Gaburro, F. Capasso, "Out-of-plane reflection and refraction of light by anisotropic optical antenna metasurfaces with phase discontinuities", *Nano Letters* 12, 1702 (2012)
- [14] P. Genevet, N. Yu, F. Aieta, J. Lin, M. A. Kats, R. Blanchard, M. O. Scully, Z. Gaburro, F. Capasso, "Ultra-thin plasmonic optical vortex plate based on phase discontinuities", *Applied Physics Letters* 100, 13101 (2012) [featured on journal cover]
- [13] R. Blanchard, S. V. Boriskina, P. Genevet, M. A. Kats, J.-P. Tetienne, N. Yu, M. O. Scully, L. Dal Negro, F. Capasso, "Multi-wavelength mid-infrared plasmonic antennas with single nanoscale focal point", *Optics Express* 19, 22113 (2011)
- [12] M. A. Kats, N. Yu, P. Genevet, Z. Gaburro, F. Capasso, "Effect of radiation damping on the spectral response of plasmonic components", *Optics Express* 19, 21749 (2011)
- [11] P. Genevet, J.-P. Tetienne, R. Blanchard, M. A. Kats, J. P. B. Muller, M. O. Scully, F. Capasso, "Enhancement of optical processes in coupled plasmonic nanocavities", *Applied Optics* 50, 56 (2011)
- [10] N. Yu, P. Genevet, M. A. Kats, F. Aieta, Jean-Philippe Tetienne, F. Capasso, Z. Gaburro, "Light propagation with phase discontinuities: Generalized laws of reflection and refraction", *Science* 334, 333 (2011) [featured on journal cover]
- [09] M. A. Kats, D. Woolf, R. Blanchard, N. Yu, F. Capasso, "Spoof plasmon analogue of metal-insulator-metal waveguides", *Optics Express* 19, 14860 (2011)
- [08] J-P Tetienne, R. Blanchard, N. Yu, P. Genevet, M. A. Kats, J. A. Fan, T. Edamura, S. Furuta, M. Yamanishi, F. Capasso, "Dipolar modeling and experimental demonstration of multi-beam plasmonic collimators", *New Journal of Physics* 13, 53057 (2011)
- [07] N. Yu, Q. J. Wang, M. A. Kats, J. A. Fan, F. Capasso, S. P. Khanna, L. Li, A. G. Davies, E. H. Linfield, "Terahertz plasmonics", *Electronics Letters* 46, 52 (2010)
- [06] D. J. Lipomi, R. V. Martinez, M. A. Kats, S. H. Kang, P. Kim, J. Aizenberg, F. Capasso, G. M. Whitesides, "Patterning the tips of optical fibers with metallic nanostructures using nanoskiving", *Nano Letters* 11, 2 (2010)
- [05] P. Genevet, J. P. Tetienne, E. Gatzogiannis, R. Blanchard, M. A. Kats, M. O. Scully, F. Capasso, "Large enhancement of nonlinear optical phenomena by plasmonic nanocavity gratings", *Nano Letters* 10, 4880 (2010)
- [04] N. Yu, Q. J. Wang, M. A. Kats, J. A. Fan, S. P. Khanna, L. Li, A. G. Davies, E. H. Linfield, F. Capasso, "Designer spoof surface plasmon structures collimate terahertz laser beams", *Nature Materials* 9, 730 (2010)
- [03] D. J. Lipomi, M. A. Kats, P. Kim, S. H. Kang, J. Aizenberg, F. Capasso and G. M. Whitesides, "Fabrication and replication of arrays of single- or multicomponent nanostructures by replica molding and mechanical sectioning", *ACS Nano* 4, 4017 (2010) [featured on journal cover]
- [02] N. Yu, M. A. Kats, C. Pflugl, M. Geiser, Q. J. Wang, M. A. Belkin, F. Capasso, M. Fischer, A. Wittmann, J. Faist, T. Edamura, S. Furuta, M. Yamanishi, and H. Kan, "Multi-beam multi-wavelength semiconductor lasers", *Applied Physics Letters* 95, 161108 (2009) [featured on journal cover]
- [01] F. Ahmad, D. Tseng, M. Kats, F. Rana, "Energy limits imposed by two-photon absorption for pulse amplification in high power semiconductor optical amplifiers", *Optics Letters* 33, 1041 (2008)

BOOK CHAPTERS

- [2] M. A. Kats, Y. Yao, C. Wang, "Plasmonics and surface plasmons", in *Encyclopedia of Plasma Technology*, Taylor & Francis (2017)
- [1] N. Yu, M. A. Kats, P. Genevet, F. Aieta, R. Blanchard, G. Aoust, Z. Gaburro, and F. Capasso, "Controlling light propagation with interfacial phase discontinuities", in *Active Plasmonics and Tuneable Metamaterials*, Wiley (2013)

PATENTS

- [4] M. A. Kats, B. S. Gundlach, "Method and apparatus for augmenting human vision". Provisional patent application filed August 2016.
- [3] N. Yu, F. Capasso, Z. Gaburro, P. Genevet, M. A. Kats, and F. Aieta, "Amplitude, phase and polarization plate for photonics". Provisional application filed Aug 2011, international application filed Aug 2012, issued Sep 2014.

[2] F. Aieta, M. Kats, P. Genevet, and F. Capasso, "Achromatic Metasurface Optical Components by Dispersive Phase Compensation". Provisional application filed Dec 2014.

[1] M. A. Kats, R. Blanchard, P. Genevet, F. Capasso, "Ultra-thin optical coatings and devices and methods of using ultra-thin optical coatings", priority date June 2012, filing date June 2013, publication date Dec 2013.

PROFESSIONAL ACTIVITIES Referee for *Physical Review Letters, Science, Nature Nanotechnology, Nature Communications, Optics Express, Optics Letters, Biomedical Optics Express, Applied Physics Letters, Nano Letters, IEEE Photonics Technology Letters, Laser and Photonics Reviews, Physical Review X, ACS Nano, Advanced Materials, and Optica*

Editorial board: *Scientific Reports* (2015-2016), Editor for *PNAS* (2016-2017)

Symposium co-organizer at the *META Conference* (2016)

Organizational Committees: *OSA Novel Optical Materials and Applications* (2015, 2016, 2017), *IEEE Photonics Conference* (2015, 2016), *SPIE Photonics West* (2017)

Member of OSA, SPIE, IEEE, MRS, APS, SWE, NAS Science and Entertainment Exchange

University Committees: ECE Graduate Admissions and Fellowships (2014-2015, 2015-2016), MSE Seminars (2015-2016, 2016-2017), Wisconsin Center for Applied Microelectronics Advisory (2015-2018)

SEMINARS & COLLOQUIA

- [26] **Stanford University**, Special Seminar, Stanford, CA (2017)
- [25] **University of Michigan**, Physics Seminar, Ann Arbor, MI (2016)
- [24] **Wesleyan University**, Physics Seminar, Middletown, CT (2016)
- [23] **Helmholtz Center**, Virtual Institute Memriox Workshop, Dresden, Germany (2016)
- [22] **University of Jena**, Physics Seminar, Jena, Germany (2016)
- [21] **University of Victoria**, Optical Society of America Seminar, Victoria, Canada (2016)
- [20] **Naval Research Laboratory**, Research Seminar, Washington, DC (2016)
- [19] **Sandia National Laboratory**, SST Grand Challenge Seminar, Albuquerque, NM (2016)
- [18] **Argonne National Laboratory**, Center for Nanoscale Materials Seminar, Lemont, IL (2016)
- [17] **Harvard University**, Rowland Institute Research Seminar, Cambridge, MA (2015)
- [16] **University of Wisconsin – Madison**, R. G. Herb Condensed Matter Seminar, Madison, WI (2015)
- [15] **University of Wisconsin – Madison**, Materials Science Program Seminar, Madison, WI (2015)
- [14] **UI – Urbana Champaign**, Electrical and Computer Engineering Seminar, Champaign, IL (2015)
- [13] **MIT**, Media Lab Harvard/UCLA/MIT Triple Talks, Cambridge, MA (2014)
- [12] **Harvard University**, Electrical Engineering Seminar, Cambridge, MA (2014)
- [11] **MIT**, Mechanical Engineering Seminar, Cambridge, MA (2014)
- [10] **University of Wisconsin – Madison**, Electrical and Computer Engineering Seminar, Madison, WI (2014)
- [09] **Princeton University**, Electrical Engineering Seminar, Princeton, NJ (2014)
- [08] **Brown University**, Physics Colloquium, Providence, RI (2014)
- [07] **Univ. of Pennsylvania**, Electrical and Systems Engineering Colloquium, Philadelphia, PA (2014)
- [06] **MIT**, Micro-nano Seminar, Cambridge, MA (2014)
- [05] **California Institute of Technology**, Applied Physics Seminar, Pasadena, CA (2014)
- [04] **University of California – San Diego**, NanoEngineering Seminar, La Jolla, CA (2014)
- [03] **University of Washington**, Physics Colloquium, Seattle, WA (2014)

[02] **Harvard University**, Center for Nanoscale Systems Seminar, Cambridge, MA (2013)

[01] **Brown University**, School of Engineering Seminar, Providence, RI (2013)

INVITED CONFERENCE

PRESENTATIONS [first-author only; co-authored invited talks not listed]

- [15] M. A. Kats, “Tunable mid-infrared photonics with phase transition materials”, META Conference, Malaga, Spain (2016)
- [14] M. A. Kats, “Reconfigurable infrared photonics with phase-transition materials”, Novel Optical Materials and Applications (NOMA), Vancouver (2016)
- [13] M. A. Kats et al, “Active optical metasurfaces based on defect-engineered phase change materials”, Physics of Quantum Electronics, Snowbird, Utah (2016)
- [12] M. A. Kats, “Engineering of optical absorption and radiative thermal emission using vanadium dioxide”, META Conference, New York (2015)
- [11] M. A. Kats, “Ultra-thin optical interference coatings”, Canadian Chemistry Conference, Ottawa (2015)
- [10] M. A. Kats, “Tunable thin film optics and metamaterials based on vanadium dioxide”, Novel Optical Materials and Applications (NOMA), Boston (2015)
- [09] M. A. Kats (replacing Federico Capasso) et al, “Infrared applications of vanadium dioxide: a tunable disordered metamaterial”, SPIE Optics and Photonics, San Diego (2014)
- [08] M. A. Kats (replacing Federico Capasso) et al, “Mid-infrared nanoplasmonics on graphene: antenna-enhanced modulators and photodetectors”, SPIE Optics and Photonics, San Diego (2014)
- [07] M. A. Kats, “Thin film interference in ultra-thin layers: color coatings, tunable absorbers, and thermal emitters”, NanoLight, Benasque, Spain (2014)
- [06] M. A. Kats, “Origins of resonance broadening in plasmonic nanostructures”, Physics of Quantum Electronics, Snowbird (2014)
- [05] M. A. Kats (replacing Federico Capasso) et al, “Widely tunable plasmonic antennas with graphene and applications to high responsivity, high speed detectors”, Physics of Quantum Electronics, Snowbird (2014)
- [04] M. A. Kats et al, “Ultra-thin optical coatings based on strong interference effects in highly absorbing media”, SPIE Optics and Photonics, San Diego (2013)
- [03] M. A. Kats and F. Capasso, “New optical coatings and perfect absorbers based on strong interference effects in highly absorbing media”, Materials Research Society Spring Meeting, San Francisco (2013)
- [02] M. A. Kats, “Ultra-thin optical coatings and perfect absorbers based on strong interference effects in highly absorbing media”, Physics of Quantum Electronics, Snowbird (2013)
- [01] M. A. Kats et al, “Controlling electromagnetic fields with phase discontinuities”, SPIE Optics and Photonics, San Diego (2012)

CONTRIBUTED PRESENTATIONS

BY KATS GROUP [underline = Kats group member]

- [10] P. J. Roney, A. Shahsafi, Z. Zhang, Y. Zhou, C. Wan, R. Wambold, J. Salman, S. Ramanathan, M. A. Kats, “Zero-Differential Thermal Emission Using Thermochromic Samarium Nickelate”, Conference on Lasers and Electro-Optics (CLEO), San Jose (2017)
- [9] A. Shahsafi, Y. Xiao, J. Salman, B. S. Gundlach, C. Wan, P. J. Roney, M. A. Kats, “Mid-Infrared Optics Using Low-Loss Materials with Refractive Index Below Unity”, MRS Spring, Phoenix (2017)
- [8] Z. Yu, C. Wan, B. S. Gundlach, J. Salman, Y. Xiao, Z. Yu, M. A. Kats, “Multi-Refractive-Index Metamaterials Using Subwavelength Waveguide Arrays”, MRS Spring, Phoenix (2017)
- [7] C. Wan, E. Horak, Y. Zhou, Z. Zhang, J. Salman, J. Rensberg, P. Roney, B. Gundlach, C. Ronning, S. Ramanathan, R. Goldsmith, M. A. Kats, “Optical power diodes based on phase-transition materials”, SPIE Photonics West, San Francisco (2017)

- [6] B. Gundlach, A. Shahsafi, G. Vershbow, C. Wan, J. Salman, B. Rokers, M. A. Kats, “Enhancing human color vision with thin-film optical filters by breaking binocular redundancy”, SPIE Photonics West, San Francisco (2017)
- [5] J. Salman, M. Hafermann, J. Rensberg, C. Wan, R. Wambold, B. Gundlach, C. Ronning, M. A. Kats, “Optical and Plasmonic Devices in the Infrared Using Ion-Implanted Semiconductors”, SPIE Photonics West, San Francisco (2017) [poster]
- [4] J. Rensberg, C. Wan, S. Richter, Y. Zhou, S. Zhang, R. Schmidt-Grund, S. Ramanathan, F. Capasso, M. A. Kats, Carsten Ronning “Wavelength- and temperature-tunable ultra-thin perfect absorbers using ion beam irradiation”, Materials Research Society (MRS), Boston (2016)
- [3] J. Rensberg, S. Zhang, Y. Zhou, A. S. McLeod, C. Schwarz, M. Goldflam, R. Nawrodt, M. Liu, J. Kerbusch, S. Ramanathan, D. N. Basov, F. Capasso, C. Ronning, M. A. Kats, “Metasurfaces based on artificially induced phase coexistence in phase-change materials”, Novel Optical Materials and Applications (NOMA), Boston (2015)
- [2] S. Zhang, J. Rensberg, Y. Zhou, A. S. McLeod, C. Schwarz, M. Goldflam, R. Nawrodt, M. Liu, J. Kerbusch, S. Ramanathan, D. N. Basov, F. Capasso, C. Ronning, M. A. Kats, “Effective medium designs based on defect engineering techniques on VO₂ thin films”, Materials Research Society (MRS), Boston (2015)
- [1] J. Rensberg, S. Zhang, Y. Zhou, A. S. McLeod, C. Schwarz, M. Goldflam, R. Nawrodt, M. Liu, J. Kerbusch, S. Ramanathan, D. N. Basov, F. Capasso, C. Ronning, M. A. Kats, “Defect engineering of VO₂ to create temperature-tunable meta-devices”, Materials Research Society (MRS), Boston (2015)

CONTRIBUTED TALKS

BY KATS

[first-author only; co-authored contributed talks not listed]

- [14] M. A. Kats et al, “Perfect thermal emission and large broadband negative differential thermal emittance from a VO₂/sapphire thin film geometry”, MRS Fall Meeting, Boston (2013)
- [13] M. A. Kats et al, “Ultra-thin optical films for enhanced light absorption”, MRS Fall Meeting, Boston (2013)
- [12] M. A. Kats et al, “Negative differential thermal emitter”, SPIE Optics and Photonics, San Diego (2013)
- [11] M. A. Kats et al, “Negative differential thermal emitter”, Conference on Lasers and Electro-Optics (CLEO/QELS), San Jose (2013)
- [10] M. A. Kats et al, “Ultra-thin tunable perfect absorber”, SPIE Photonics West, San Francisco (2013)
- [9] M. A. Kats et al, “Monte-Carlo FDTD approach to modeling ensembles of polydisperse plasmonic nanoparticles”, SPIE Photonics West, San Francisco (2013)
- [8] M. A. Kats et al, “Ultra-thin perfect absorber using a tunable phase change material”, MRS Fall Meeting, Boston (2012)
- [7] M. A. Kats et al, “V- and Y-shaped plasmonic antennas for birefringent flat optics”, SPIE Optics and Photonics, San Diego (2012)
- [6] M. A. Kats et al, “Ultra-thin reconfigurable perfect absorber enabled by phase co-existence in a correlated oxide”, International Conference on Optical, Optoelectronic, and Photonic Materials and Applications, Nara, Japan (2012)
- [5] M. A. Kats et al, “Phase elements for surface optics”, Conference on Lasers and Electro-Optics (CLEO/QELS), San Jose (2012)
- [4] M. A. Kats et al, “Spoof plasmon analogue of metal-insulator-metal waveguides”, SPIE Photonics West, San Francisco (2012)
- [3] M. A. Kats et al, “Widely tunable V-shaped plasmonic antennas for planar optics”, SPIE Photonics West, San Francisco (2012)
- [2] M. A. Kats et al, “Large area multi-material plasmonic nanostructures fabricated by replication molding and mechanical sectioning”, Conference on Lasers and Electro-Optics (CLEO/QELS), San Jose (2010) [post deadline talk]
- [1] M. Kats et al, “Amplification of high energy picosecond pulses using slab-coupled waveguide amplifiers at 1550 nm”, Conference on Lasers and Electro-Optics (CLEO/QELS), San Jose (2008)

GRANTS AND CONTRACTS

- [4] Title: Far-infrared optoelectronics based on the valley Hall effect
Sponsor: Wisconsin Alumni Research Foundation
Date: July 2017 – June 2018
Amount: **\$39,270.00**
Role: **PI**
- [3] Title: MRI: Acquisition of an Electron Beam Lithography System for Nanofabrication at the UW-Madison and Regional Universities
Sponsor: National Science Foundation
Date: August 2016 – July 2018
Amount: **\$799,995.00**
Role: **co-PI**, with PI Mark Eriksson and co-PIs Junhong Chen, Robert McDermott, and Michael Arnold
- [2] Title: Young Investigator Program: Optical limiters, fuses, and diodes for protection from high intensity light sources
Sponsor: Office of Naval Research
Date: June 2016 – May 2019
Amount: **\$510,000.00**
Role: **PI**
- [1] Title: Phase change metasurfaces
Sponsor: Wisconsin Alumni Research Foundation
Date: July 2016 – June 2017
Amount: **\$38,823.00**
Role: **PI**

TEACHING EXPERIENCE

University of Wisconsin – Madison (as Lecturer)

ECE 601: Nanophotonics

Fall 2015, 2016

- Re-designed from scratch a graduate-level course covering photonics at nanometer and micrometer length scales. Topics include: EM waves in dielectrics and metals; computational electromagnetics; waveguides and waveguide coupling; optical resonators; basic nanofabrication techniques; thin-film interference; surface plasmon polaritons; localized surface plasmon resonances; applications of plasmonics; super-resolution imaging; composite materials and metamaterials; metasurfaces.
- Course evaluations: **4.8/5** (2015), **4.8/5** (2016)

ECE 434: Photonics

Spring 2015, 2016, 2017

- Re-designed from scratch an introductory undergraduate-level course on optics and photonics. Topics include: Maxwell's equations; electromagnetic waves; polarization states; various speeds of light; ray optics; optical properties of materials; optics of interfaces; applications of total internal reflection; fiber communication; optical properties of metals; interference and interferometers; thin-film optics; basic materials characterization; microscopes and telescopes; human eye and visual system; light sources
- Course evaluations: **4.7/5** (2015), **4.8/5** (2016)

Harvard University (as Teaching Fellow)

ES 174: Photonics and Electronics Lab

Spring 2010

- Led lab sessions for a senior-level course in electronic and photonic devices, and micro-fabrication technology.

Cornell University (as Teaching Assistant / Grader)

AEP 321 and 322: Mathematical Physics I and II

Fall 2006 – Spring 2007

- Held office hours and graded for a year-long junior-level course in mathematical methods for physics and engineering.

RESEARCH ADVISING AND MENTORING AT UW-MADISON

PhD Students

Chenghao Wan (MSE, 2015-present)
 Alireza Shahsafi (ECE, 2016-present)
 Zhaoning (April) Yu (Physics, 2016-present)
 Raymond Wambold (ECE, 2016-present)

MS Students (terminal)

Bradley Gundlach (ECE, 2015-present)
 Patrick Roney (ECE, 2015-present)
 Jad Salman (ECE, 2015-2016), *graduated*

Postdocs

Yuzhe Xiao (2016 – present)

Research Interns

Jonathan King (2017 – present)

Undergraduate students @ UW Madison

Nolan Urbanek (Fall 2016), *graduated*
 Anthony Wang (Fall 2016)

Visiting undergraduate students

Manuel Martinez (UT-El Paso, Summer 2016)
 Graham Joe (Waterloo, Spring – Summer 2017)

PhD Thesis Committees

Solomon Mikael (ECE, 2015); Hongyi Mi (ECE, 2015); Guilhem Ribeill (Physics, 2016); Dong-Wook Park (ECE, 2016); Xiangyu Guo (ECE, 2016); Amirhossein Davoody (ECE, 2016); Hung Luyen (ECE, 2017)

Preliminary/Qualifying Exam Committees

Xiangyu Guo (ECE, 2015); Hung Luyen (ECE, 2015); Ting-Yen Shih (ECE, 2015); Dong-Wook Park (ECE, 2015); Solomon Mikael (ECE, 2015); Meng-Yin Wu (MSE, 2016); Emmy Tomforde (Nelson Inst., 2016)

MS Thesis Committees

Chenghao Wan (MSP, 2015); Jonathan King (Eng. Physics, 2016)

Other Advising

Undergraduate advisor for the Applied Math, Engineering, and Physics (AMEP) program (2016-present)

Student Awards (entering, during, and immediately after working with Kats)

- [7] Advanced Materials Industrial Consortium Seed Project (2016, [Nolan Urbanek](#) and [April Yu](#))
- [6] Walsh Research Travel Award, McPherson Eye Research Institute (2016, [Bradley Gundlach](#))
- [5] Honorable Mention (2nd place), McPherson ERI Vision Science Poster Session (2016, [Bradley Gundlach](#))
- [4] Wisconsin Distinguished Graduate Fellowship (2016, [Raymond Wambold](#))
- [3] Frank Rogers Bacon Fellowship (2015, [Jad Salman](#))
- [2] NSF Graduate Research Fellowship (2015, [Bradley Gundlach](#))
- [1] Sandia National Labs Critical Skills Master's Program Fellowship (2015, [Patrick Roney](#))

ETCETERA

Citizenship: USA
 Languages: English and Russian
 Erdős number ≤ 4