

# Matthew F. Doty

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## Education

2004 - 2007 National Research Council Research Associate  
Naval Research Laboratory

2001 - 2004 Ph.D. in Physics  
The University of California, Santa Barbara

1998 - 2001 MA in Physics  
The University of California, Santa Barbara

1994 - 1998 BS in Physics Summa Cum Laude  
The Pennsylvania State University

## Professional Appointments

2021- Founding Director, Quantum Science and Engineering Program

2019 Founding Director, Delaware Institute for Materials Research

2019- Professor, Materials Science and Engineering (primary), Physics, and  
Electrical and Computer Engineering

2017-2019 Director, UD Nanofabrication Facility

2015-2017 Co-Director, UD Nanofabrication Facility

2013-2019 Associate Professor of Materials Science and Engineering  
University of Delaware

2012-2015 Associate Director, UD Nanofabrication Facility

2012- Assistant Professor of Electrical and Computer Engineering (affiliated  
appointment)  
University of Delaware

2012- Affiliate Faculty, Institute for Energy Conversion  
University of Delaware

2009- Assistant Professor of Physics (affiliated appointment)  
University of Delaware

2007-2013 Assistant Professor of Materials Science and Engineering  
University of Delaware

## Academic Honors and Awards

2012 UD College of Engineering Outstanding Junior Faculty Award

2010 DuPont Young Professor Award

2010 Veeco Research Collaboration Gift

2010 University of Delaware Research Foundation Strategic Initiatives Award

2009 NSF CAREER Award

2008 University of Delaware Research Foundation Award

## Publications

70. D. Q. To, Z. Wang, Y. Liu, W. Wu, M.B. Jungfleisch, J.Q. Xiao, J. M. O. Zide, S. Law and M. F. Doty. Surface plasmon-phonon-magnon polariton in a topological insulator-antiferromagnetic bilayer structure. *Physical Review Materials* **6** 085201 (2022)  
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69. D. Q. To, Z. Wang, D. Q. Ho, R. Hu, W. Acuna, Y. Liu, G. W. Bryant, A. Janotti, J. M. O. Zide, S. Law and M. F. Doty. Strong coupling between a topological insulator and a III-V heterostructure at terahertz frequency. *Physical Review Materials* **6** 035201 (2022)  
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68. M. A. Lloyd, X. Ma, A. G. Kuba, B. E. McCandless, M. F. Doty and R. Birkmire. Effects of composition and thermal treatment on V<sub>OC</sub>-limiting defects in single-crystalline Cu<sub>2</sub>ZnSnSe<sub>4</sub> solar cells. *Progress in Photovoltaics: Research and Applications* **1** (2021).  
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67. W. Wu, C. Yaw Ameyaw, M. F. Doty and M. B. Jungfleisch. *Principles of spintronic THz emitters*. *Journal of Applied Physics* **130** 091101 (2021).  
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66. E. Y. Chen, T. A. Welsch, J. M. Cleveland, C. C. Milleville, K. R. Lennon, H. Y. Ramirez, J. M. O. Zide, D. B. Chase and M. F. Doty. *Time- and Excitation-Dependent Photon Emission from Double Quantum Dot Upconverting Nanostructures*. *The Journal of Physical Chemistry C* **125** 17183 (2021).  
<https://pubs.acs.org/doi/abs/10.1021/acs.jpcc.1c03607>
65. J. Yue, N. F. Quackenbush, I. Laraib, H. Carfagno, S. Hameed, A. Prakash, L. R. Thoutam, J. M. Ablett, T.-L. Lee, M. Greven, M. F. Doty, A. Janotti and B. Jalan. *Electronic structure and small-hole polarons in YTiO<sub>3</sub>*. *Physical Review Materials* **4** 112001(R) (2020)  
<http://dx.doi.org/10.1103/physrevmaterials.4.112001>
64. Y. Wang, Y. Wang, T. Wang, X. Wang, Y. Ou, Y. Ji, M.F. Doty, S.A. Law, and J.Q. Xiao. *One-dimensional antilocalization of electrons from spin disorder probed by nonlinear Hall effect* *Phys. Rev. B* **102** 125430 (2020)  
<https://doi.org/10.1103/PhysRevB.102.125430>
63. D. Mao, M. Chen, X. Ma, A. Soman, H. Xing, T. Kananen, N. Augenbraun, C. Cheng, M. Doty and T. Gu. *Sub-bandgap pulsed laser patterning of planar chalcogenide micropotonics*. *Optical Materials Express* **10** 2126 (2020).  
<https://doi.org/10.1364/OME.398422>
62. X. Ma, Y. Wang, J. M. O. Zide and M. F. Doty. *Three-Electrode Device for Applying Two-Dimensional Vector Electric Fields to Single InAs Quantum Dots*. *Physical Review Applied* **13** 064029 (2020)  
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61. L. N. McCabe, Y. Wang, M. F. Doty and J. M. O. Zide. Low-density patterned InAs quantum dot arrays. *Journal of Vacuum Science & Technology B* **38** 022803 (2020)  
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60. Y.-S. Ou, X. Zhou, R. Barri, Y. Wang, S. Law, J. Q. Xiao and M. F. Doty. Development of a system for low-temperature ultrafast optical study of three-dimensional magnon and spin orbital torque dynamics. *Review of Scientific Instruments*. **91** 033701 (2020)  
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59. C. Jennings, X. Ma, T. Wickramasinghe, M. Doty, M. Scheibner, E. Stinaff, M. Ware. Self-Assembled InAs/GaAs Coupled Quantum Dots for Photonic Quantum Technologies. *Advanced Quantum Technologies*. 1900085 (2019)  
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58. X. Zhou, H. Chen, Y.-S. Ou, T. Wang, R. Barri, H. Kannan, J. Q. Xiao, M. F. Doty. Investigation of spin orbit torque driven dynamics in ferromagnetic heterostructures. *Journal of Magnetism and Magnetic Materials*. **503** 166211 (2020)  
<https://doi.org/10.1016/j.jmmm.2019.166211>
57. D. Mao, M. Chen, N. Augenbraun, A. Soman, X. Ma, T. Kananen, M. F. Doty, T. Gu. Micromachining of chalcogenide waveguides by picosecond laser. *Conference on Lasers and Electro-Optics. OSA Technical Digest*. SF3O.5. (2019)  
[http://www.osapublishing.org/abstract.cfm?URI=CLEO\\_SI-2019-SF3O.5](http://www.osapublishing.org/abstract.cfm?URI=CLEO_SI-2019-SF3O.5)
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55. A. Lin, M. F. Doty, G. W. Bryant. *Incorporation of random alloy GaBi<sub>x</sub>As<sub>1-x</sub> barriers in InAs quantum dot molecules: Energy levels and confined hole states*. *Physical Review B* **99** 075308 (2019)  
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54. C. C. Milleville, E. Y. Chen, K. R. Lennon, J. M. Cleveland, A. Kumar, J. Zhang, J. A. Bork, A. Tessier, J. M. LeBeau, D. B. Chase, J. M. O. Zide, M. F. Doty. *Engineering Efficient Photon Upconversion in Semiconductor Heterostructures*. *ACS Nano* **13** 489 (2019)  
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53. E. Y. Chen, C. Milleville, J. M. O. Zide, M. F. Doty and J. Zhang. Upconversion of low-energy photons in semiconductor nanostructures for solar energy harvesting. *MRS Energy & Sustainability* **5** E16 (2018)  
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52. H. Celik, H. Kannan, T. Wang, A. R. Mellnik, X. Fan, X. Zhou, D. C. Ralph, M. F. Doty, V. O. Lorenz, J. Q. Xiao. *Vector-resolved magneto-optic Kerr effect measurements of spin-orbit torque*. IEEE Transaction on Magnetics. **55** 4100105 (2019) [0]  
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51. E.Y. Chen, Z. Li, C.C. Milleville, K.R. Lennon, J.M.O. Zide, M.F. Doty. *CdSe(Te)/CdS/CdSe Rods vs. CdTe/CdS/CdSe Spheres: Morphology-Dependent Carrier Dynamics for Photon Upconversion*. IEEE Journ. of Photovoltaics. **8** 746 (2018) [1]  
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50. M.F. Doty, X. Ma, J.M.O. Zide, G.W. Bryant. *Molecular engineering with artificial atoms: designing a material platform for scalable quantum spintronics and photonics*, Proc. SPIE 10357, Spintronics X, 1035739 (2017) [0]  
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47. K. Das, S. Sanwlani, K. Rawat, C.R. Haughn, M.F. Doty, H.B. Bohidar. *Spectroscopic Profile of Surfactant Functionalized CdSe Quantum Dots and Their Interaction with Globular Plasma Protein BSA*. Colloids and Surfaces A: Physicochemical and Engineering Aspects **405** 495 (2016) [3]  
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45. X. Ma, G.W. Bryant, M.F. Doty. *Hole spins in an InAs/GaAs quantum dot molecule subject to lateral electric fields*. Physical Review B **93** 245402 (2016) [2]  
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43. D.G. Sellers, E.Y. Chen, S. Polly, S.M. Hubbard, M.F. Doty. *Effect of doping on room temperature carrier escape mechanisms in InAs/GaAs quantum dot p-i-n junction photovoltaic cells*. *Journ. Appl. Phys.* **119** 194301 (2016) [3]  
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42. E.Y. Chen, J. Zhang, D.G. Sellers, Y. Zhong, J.M.O. Zide, M.F. Doty. *A kinetic rate model of novel upconversion nanostructures for high-efficiency photovoltaics*. *Proceedings of the 42<sup>nd</sup> Photovoltaic Specialist Conference (PVSC)* (2015) [0]  
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41. D.G. Sellers, M.F. Doty. *Design, synthesis and photophysical properties of InP/CdS/CdSe and CdTe/CdS/CdSe (core/shell/shell) quantum dots for photon upconversion*. *Proceedings of the 42<sup>nd</sup> Photovoltaic Specialist Conference (PVSC)* (2015) [3]  
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40. X. Zhou, M. Royo, W. Liu, J.H. Lee, G. J. Salamo, J. I. Climente, M.F. Doty. *Diamagnetic and paramagnetic shifts in self-assembled InAs lateral quantum dot molecules*. *Physical Review B* **91** 205427 (2015) [2]  
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39. C.C. Bomberger, L.R. Vanderhoef, A. Rahman, D. Shah, D.B. Chase, A.J. Taylor, A.K. Azad, M.F. Doty, J.M.O. Zide. *Determining the band alignment of TbAs:GaAs and TbAs:In<sub>0.53</sub>Ga<sub>0.47</sub>As*. *Appl. Phys. Lett.* **107** 102103 (2015) [4]  
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38. F. Xu, L.F. Gerlein, X. Ma, C.R. Haughn, M.F. Doty, S.G. Cloutier. *Impact of Different Surface Ligands on the Optical Properties of PbS Quantum Dot Solids*. *materials*, **8** 1858 (2015) [24]  
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37. M. Möbius, X. Ma, J. Martin, M.F. Doty, T. Otto, T. Gessner. *Photoluminescence quenching of InP/ZnS quantum dots by charge injection*. *SPIE Proceedings: Recent Advances in Quantum Sensing and Nanophotonics*. **9370** 93701X (2015)  
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36. D.G. Sellers, S.J. Polly, Y. Zhong, S.M. Hubbard, J.M.O. Zide, M.F. Doty. *New Nanostructured Materials for Efficient Photon Upconversion*. *IEEE Journ. of Photovoltaics*. **5** 224 (2015) [9]  
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35. X.R. Zhou, M.F. Doty. *Design of 4-electrode optical device for application of vector electric fields to self-assembled quantum dot complexes*. *Journ. Appl. Phys.* **116** 163101 (2014) [4]  
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34. C.R. Haughn, E.H. Steenbergen, L.J. Bissell, E.Y. Chen, K.G. Eyink, J.M.O. Zide, M.F. Doty. *Carrier transfer from InAs quantum dots to ErAs metal nanoparticles*. Appl. Phys. Lett. **105** 103108 (2014) [3]  
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33. D.G. Sellers, S. Polly, S.M. Hubbard, M.F. Doty. *Analyzing carrier escape mechanisms in InAs/GaAs quantum dot p-i-n junction photovoltaic cells*. Appl. Phys. Lett. **104** 223903 (2014) [27]  
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32. F. Xu, C.R. Haughn, X. Ma, M.F. Doty, S.G. Cloutier. *Charge-Transfer Dynamics in Multilayered PbS and PbSe Quantum Dot Architectures*. Applied Physics Letters, **104** 051112 (2014) [8]  
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31. L. R. Vanderhoef, A.K. Azad, C.C. Bomberger, D.R. Chowdhury, D.B. Chase, A.J. Taylor, J.M.O. Zide, M.F. Doty. *Charge carrier relaxation processes in TbAs nanoinclusions in GaAs measured by optical-pump THz-probe transient absorption spectroscopy*, Physical Review B **89** 045418 (2014) [11]  
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30. X. Ma, J. Benavides, C.R. Haughn, F. Xu, M.F. Doty, S.G. Cloutier. *High polymer-LEDs enhancement by exciton-plasmon coupling using encapsulated metallic nanoparticles*. Organic Electronics **14** 1916 (2013) [15]  
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29. W. Liu, A.S. Bracker, D. Gammon, M.F. Doty. *Dynamic hole trapping in InAs/AlGaAs/InAs quantum dot molecules*. Phys. Rev. B **87** 195308 (2013) [11]  
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28. C.R. Haughn, K.J. Schmieder, J.M.O. Zide, A. Barnett, C. Ebert, R. Opila, M.F. Doty. *Quantification of trap state densities in GaAs heterostructures grown at varying rates using intensity-dependent time resolved photoluminescence*. Applied Physics Letters, **102** 182108 (2013) [15]  
<http://dx.doi.org/10.1063/1.4802841>
27. X. Zhou, J.H. Lee, G.J. Salamo, M. Royo, J.I. Climente, M.F. Doty. *Coulomb interaction signatures in self-assembled lateral quantum dot molecules*. Phys. Rev. B **87** 125309 (2013) [15]  
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- Work done prior to application for promotion to Associate Professor (Fall 2012)*
26. S. E. Economou, J.I. Climente, A. Badolato, A.S. Bracker, D. Gammon, M.F. Doty. *Scalable qubit architecture based on holes in quantum dot molecules*, Phys. Rev. B **86** 085319 (2012) [42]  
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23. W.M. Reid, T. Driscoll, M.F. Doty. *Forming delocalized intermediate states with realistic quantum dots*. Journ. Appl. Phys. **111** 056102 (2012) [9]  
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22. X. Zhou, S. Sanwlani, W. Liu, J.H. Lee, Zh. M. Wang, G. Salamo, M.F. Doty. *Spectroscopic signatures of many-body interactions and delocalized states in self-assembled lateral quantum dot molecules*. Phys. Rev. B **84** 205411 (2011) [19]  
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21. F. Xu , X. Ma , C. R. Haughn , J. Benavides , M. F. Doty , and S. G. Cloutier. *Efficient Exciton Funnelling in Cascaded PbS Quantum Dot Superstructures*. ACS Nano **5** 9950 (2011) [55]  
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20. W. Liu, S. Sanwlani, R. Hazbun, J. Kolodzey, A.S. Bracker, D. Gammon, M.F. Doty. *In-situ tunable g factor for a single electron confined in an InAs quantum dot molecule*. Phys. Rev. B **84** 121304(R) (2011) [15]  
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19. K. Schmieder, C.R. Haughn, Z. Pulwin, D. Dyer, J. Mutitu, M.F. Doty, C. Ebert, A. Barnett. *Analysis of High Growth Rate MOCVD Structures by Solar Cell Device Measurements* Proceedings of 37th IEEE Photovoltaic Specialist Conference 000542 (2011) [0]  
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18. L.E. Cassels, T.E. Buehl, P.G. Burke, C. J. Palmstrom, A.C. Gossard, G. Pernot, A. Shakouri, C.R. Haughn, M.F. Doty, J.M.O. Zide. *Growth and characterization of TbAs:GaAs nanocomposites*. J. Vac. Sci. Technol. B **29** 03C114 (2011) [22]  
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17. W. Yin, M. Doty, C. Ni, C. Hu, M. Cao, B. Wei. *Vertically Well-aligned In2O3 Cone-like Nanowire arrays grown on Indium substrates*. Eur. Journ. Inorg. Chem. **2011** 1570 (2011) [8]  
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16. J. Planelles\*, J.I. Climente, F. Rajadell, M.F. Doty, A.S. Bracker, D. Gammon. *Effect of strain and variable mass on the formation of antibonding hole ground states in InAs quantum dot molecules*. Phys. Rev. B **82** 155307 (2010) [28]  
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  12. M.F. Doty, M. Scheibner, A.S. Bracker, I.V. Ponomarev, T.L. Reinecke, D. Gammon. *Optical spectra of doubly charged quantum dot molecules in electric and magnetic fields* Phys. Rev. B. **78** 115316 (2008) [58]  
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11. M. Scheibner, M. Yakes, A.S. Bracker, I.V. Ponomarev, M.F. Doty, C.S. Hellberg, L.J. Whitman, T.L. Reinecke, D. Gammon. *Optically mapping the electronic structure of coupled quantum dots*. Nature Physics. **4** 291 (2008) [81]  
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  10. M. Scheibner, M.F. Doty, I.V. Ponomarev, A.S. Bracker, E.A. Stinaff, V.L. Korenev, T.L. Reinecke, D. Gammon. *Spin Fine-Structure in Optically Excited Quantum Dot Molecules*. Phys. Rev. B **75**, 245318 (2007) [96]  
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1. M.F. Doty, B.E. Cole, B.T. King, M.S. Sherwin. *Wavelength-specific laser-activated switches for improved contrast ratio in generation of short THz pulses*. Rev. Sci. Inst. **75** 2921 (2004) [19]  
<http://dx.doi.org/10.1063/1.1783594>

### Invited Book Chapters as lead author

2. “Holes in Quantum Dot Molecules: Structure, Symmetry, and Spin,” Quantum Dots: Optics, Electron Transport and Future Applications, edited by Alexander Tartakovskii, Cambridge University Press, 2012
1. “Optical spectroscopy of spin in coupled quantum dots,” Single Semiconductor Quantum Dots, edited by Peter Michler, Springer, 2009

### Patents

1. M.F. Doty, J.M.O. Zide. “Novel Nanostructures for efficient photon upconversion,” Patent 9,954,129 issued 4/24/2018

Invited Presentations

42. 2021 IBM-HBCU Quantum Collaboration
41. 2018 MRS Spring Meeting: Energy Materials and Technology
40. 2017 SPIE Optics+Photonics: Spintronics X
39. 2017 Columbia Nano Initiative Colloquium, Columbia University
38. 2017 Institute for Advanced Materials, Devices, and Nanotechnology, Rutgers
37. 2016 Department of Chemistry, Delaware State University
36. 2015 Materials Research Institute, Penn State University
35. 2015 Department of Electrical Engineering, Johns Hopkins University
34. 2015 Quantum Science and Information Technology Group, ETH, Zurich
33. 2015 Fraunhofer Institute for Solar Energy, Freiburg, Germany
32. 2015 New Vistas in Photovoltaics Symposium, sponsored by U. Penn
31. 2015 National Science Foundation: EFRI program
30. 2015 University of Ottawa / National Research Council of Canada
29. 2013 NanoPower Research Lab, Rochester Institute of Technology
28. 2013 Department of Physics, University of Rochester
27. 2013 University of Delaware Energy Institute Annual Symposium

*Presentations prior to application for promotion to Associate Professor (Fall 2012)*

26. 2012 Materials Research Society Fall meeting
25. 2012 Intermag (IEEE international conference on magnetics) plenary tutorial
24. 2012 University of Delaware Energy Institute Annual Symposium
23. 2012 Dept. of Physics, University of Maryland
22. 2012 Dept. of Electrical and Computer Engineering, University of Delaware
21. 2012 Dept. of Materials Science, University of Pennsylvania
20. 2011 Dept. of Polymer Science and Engineering, University of Massachusetts, Amherst
19. 2011 Dept. of Physics, Mount Holyoke College
18. 2011 4<sup>th</sup> US-China workshop on nanostructured materials for global energy
17. 2011 Villa Conference on Interacting Nanostructures
16. 2010 Virtual Conference on Nanoscale Science and Technology, Sydney, Australia
15. 2010 Dept. of Materials Science and Engineering, Rutgers
14. 2009 Dept. of Physical Chemistry, King Jaume I University, Castello, Spain
13. 2009 Workshop on Single Quantum Devices, Stuttgart, Germany
12. 2009 Dept. of Physics, University of Delaware
11. 2009 Dept. of Physics, Millersville University
10. 2009 Dept. of Physics, University of Arkansas
9. 2009 Dept. of Materials Science and Engineering, MIT
8. 2009 NIST Quantum Processes and Metrology Division
7. 2008 Dept. of Physics, University of Massachusetts, Amherst
6. 2008 American Physical Society March Meeting
5. 2007 G.E. Global Research
4. 2007 Dept. of Physics and Astronomy, University of Pittsburgh
3. 2007 Dept. of Physics and Astronomy, Syracuse University
2. 2006 College of Nanoscale Science and Engineering, University of Albany
1. 2000 American Physical Society April Meeting

## Grants and Awards

### 22. RII Track-2 FEC: Laying the Foundation for Scalable Quantum Photonic Technologies

Source of Support: National Science Foundation [PI: Balakrishnan (UNM), UD-PI (Doty), Co-PIs Chakraborty (UD); Drake, Osinski (UNM)]  
 Total Award Amount: \$4,000,000 (\$2M UD)  
 Total Award Period: 8/1/2022-7/31/2026

### 21. University of Delaware MRSEC - Center for Hybrid, Active, and Responsive Materials (CHARM)

Source of Support: National Science Foundation (PI: Epps. Doty IRG2 Co-Lead)  
 Total Award Amount: \$18,000,000 (expected)  
 Total Award Period: 9/1/2020-8/31/2026

### 20. Rethinking Photon Harvesting

Source of Support: Delaware Energy Institute (Co-PIs Zide, Law)  
 Total Award Amount: \$326,376  
 Total Award Period: 2/1/2019-1/31/2021

### 19. Spin Orbitronics in Topological Quantum Matter Based Heterostructures

Source of Support: DOE (PI Xiao, Co-PIs Law, Nikolic)  
 Total Award Amount: \$760,698.00  
 Total Award Period: 8/1/2018 - 7/31/2021

### 18. RAISE-TAQS: Collaborative: Inverting the design paradigm: Tunable qubits in hybrid photonic materials as a scalable platform for quantum photonic devices

Source of Support: National Science Foundation  
 (co-PIs Zide, Law, Economou, Vuckovic)  
 Total Award Amount: \$999,995.00  
 Total Award Period: 9/15/2018-8/31/2021

### 17. MRI: Acquisition of a III-V Molecular Beam Epitaxy System for a new Materials Growth User Facility

Source of Support: National Science Foundation (PI Zide, Co-PI Law)  
 Total Award Amount: \$1,000,000.00  
 Total Award Period: 9/1/2016-8/31/2020

### 16. EAGER: Enabling Quantum Leap: Topological nanoparticles as potential room-temperature qubits

Source of Support: National Science Foundation (PI Law)  
 Total Award Amount: \$300,000.00  
 Total Award Period: 12/1/2018– 11/30/2020

### 15. Optically controlled release of proteins to develop deep-tissue therapies

Source of Support: DE Bioscience Center for Advanced Technology

(PI A. Kloxin, Co-Pi Kiick)

Total Award Amount: \$75,000, ~\$30,000 for Doty

Total Award Period Covered: 08/01/16 – 07/31/18

14. MRI: Development of a system for low temperature optical measurement of 3D magnon, plasmon and spin torque transfer dynamics  
Source of Support: National Science Foundation (co-PIs Xiao, Law)  
Total Award Amount: \$650,728 from NSF, required UD match \$278,883  
Total Award Period Covered: 09/01/16 – 08/30/19
13. OP: Spatial and spectral control of quantum dot single photon emitters for scalable photonic devices  
Source of Support: National Science Foundation (co-PI Zide) (ECCS-1609157)  
Total Award Amount: \$400,000  
Total Award Period Covered: 06/01/16 – 05/31/19
12. Spintronics based on topological insulators  
Source of Support: Department of Energy (PI Xiao, co-PIs Nickolic, Law)  
Total Award Amount: \$420,000, \$50,000 for Doty  
Total Award Period Covered: 09/01/16 – 08/31/18
11. Photon Ratchet: A New Paradigm for Photon Upconversion  
Source of Support: The W. M. Keck Foundation (co-PIs Zide, Sellers, Kloxin, Day, Slater)  
Total Award Amount: \$1,000,000 from Keck, \$966,000 required UD match  
Total Award Period Covered: 07/01/15 – 06/30/18
10. Development of nanostructured materials for efficient harvesting of low-energy solar photons  
Source of Support: US Army Research Laboratory (co-PI Zide)  
Total Award Amount: \$50,000  
Total Award Period Covered: 07/15/15 – 07/14/18
9. Collaborative Research: Spin physics ‘by design’ in quantum dot molecules  
Source of Support: National Science Foundation (co-PIs Zide, Bryant) (DMR-1505574)  
Total Award Amount: \$600,000  
Total Award Period Covered: 05/01/15 – 04/30/18
8. CAREER: Controllable coupling of quantum dots in scalable architectures  
Source of Support: National Science Foundation (DMR-0844747)  
Total Award Amount: \$524,997  
Total Award Period Covered: 03/01/08 – 02/28/14
7. Developing a Tunable Single-Spin Bit for Scalable Spin-Based Optoelectronics  
Source of Support: National Science Foundation (ECCS-1101754)  
Total Award Amount: \$359,996  
Total Award Period Covered: 04/01/11 – 03/31/14

6. Probing Carrier Dynamics in Novel Metal/Semiconductor Nanocomposites  
Source of Support: National Science Foundation (PI Zide) (DMR-1105137)  
Total Award Amount: \$450,000 total, \$190,765 for Doty  
Total Award Period Covered: 06/15/11 – 05/31/14
5. NUE: Integrated Approach to Undergraduate Education in Nanotechnology  
Source of Support: National Science Foundation (PI: Shah, CoPIs; Zide, Doty)  
Total Award Amount: \$199,190 total, supports undergraduate researchers only  
Total Award Period Covered: 11/01/09 – 06/30/12
4. Understanding and Overcoming Efficiency Limits in Organic Photovoltaics  
Source of Support: University of Delaware Research Foundation (PI, co-PI Mackay)  
Total Award Amount: \$45,000 total, \$25,000 for Doty  
Total Award Period Covered: 07/01/10 – 12/31/12
3. DuPont Young Professor Award  
Source of Support: DuPont Corporation  
Total Award Amount: \$75,000  
Total Award Period Covered: 08/01/10 – 07/31/13
2. Time-Resolved Photoluminescence Measurements of Photovoltaic Materials  
Source of Support: Veeco Corporation  
Total Award Amount: \$60,000  
Total Award Period Covered: 08/01/10 – 12/31/12
1. Electrically tunable electron g factors in Quantum Dot Molecules  
Source of Support: University of Delaware Research Foundation  
Total Award Amount: \$30,000  
Total Award Period Covered: 06/01/08 – 08/31/09

### Advisors

Dr. Daniel Gammon

Professor Mark Sherwin

Naval Research Laboratory

University of California, Santa Barbara

Postdoctoral Advisor

Ph.D. Advisor