1. DOMENICO PACIFICI

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RESEARCH INTERESTS

Domenico Pacifici is currently leading research projects involving the use of photons and surface plasmons in nanostructured materials for information, sensing and energy-harvesting applications. Recently, the Pacifici Group has demonstrated: (1) plasmonic concentrators for broad-band enhanced absorption in ultra-thin film solar cells, (2) germanium quantum dot photodetectors with responsivity and internal quantum efficiency rivaling those of conventional silicon-based technologies, and (3) high-throughput biochemical sensors using plasmonic interferometers integrated on-chip for detection of extremely low glucose and insulin concentrations, typically found in saliva, for non-invasive glucose screening.

2. EDUCATION

UNIVERSITY OF CATANIA, Catania, Italy
Ph.D. in Physics, *cum laude* 2004
Dissertation: *Erbium-doped silicon nanoclusters for Microphotonics*, Advisor: Prof. F. Priolo
[link to pdf **]**

UNIVERSITY OF CATANIA, Catania, Italy
Laurea in Physics (Master of Science), *summa cum laude* 2000
Dissertation: *Interaction between silicon nanocrystals and erbium ions*, Advisor: Prof. F. Priolo

3. PROFESSIONAL APPOINTMENTS

BROWN UNIVERSITY, Providence, RI
Assistant Professor, School of Engineering September 1st, 2009–present

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, CA
Senior Postdoctoral Scholar, Department of Applied Physics 2007–2009
Postdoctoral Scholar, Department of Applied Physics 2005–2007

UNIVERSITY OF CATANIA, Catania, Italy
Research Fellow, Department of Physics 2004–2005
Graduate Researcher, Department of Physics 2000–2003

4. PUBLICATIONS

1. V. S. Siu, J. Feng, P. W. Flanigan, G. T. R. Palmore, and **D. Pacifici**, *A "plasmonic cuvette": dye chemistry coupled to plasmonic interferometry for glucose sensing*, Nanophotonics 3, 125–140 (2014).
2. K. T. Gunay, P. W. Flanigan, Pei Liu, and **D. Pacifici**, *Polarization dependence of light transmission through individual nanoapertures in metal films*, Journal of the Optical Society of America B 31, 1150–1158 (2014).
3. S. Cosentino, S. Mirabella, Pei Liu, Son T Le, M. Miritello, S. Lee, I. Crupi, G. Nicotra, C. Spinella, D. Paine, A. Terrasi, A. Zaslavsky, **D. Pacifici**, *Role of Ge nanoclusters in the*

performance of photodetectors compatible with Si technology, Thin Solid Films 548, 551–555 (2013).

4. P. W. Flanigan, A. E. Ostfeld, N. G. Serrino, Z. Ye, and **D. Pacifici**, *A generalized "cut-and-projection" method for the generation of quasiperiodic plasmonic concentrators for ultra-thin film photovoltaics*, Optics Express 21, 2757–2776 (2013).
5. P. W. Flanigan, A. E. Ostfeld, Z. Ye, N. G. Serrino, and **D. Pacifici**, "Quasiperiodic plasmonic concentrators for ultra-thin film solar cells", Book Chapter, *Optics of Aperiodic Structures: Fundamentals and Device Applications*, ed. Luca Dal Negro, Pan Stanford Publishing Pte. Ltd. (2013).
6. P. W. Flanigan, A. E. Ostfeld, Z. Ye, N. G. Serrino, and **D. Pacifici**, *Quasiperiodic plasmonic concentrators for enhanced light absorption in ultra-thin film solar cells*, MRS Proceedings, 1493, pp. 323–328 (2013).
7. Pei Liu, S. Cosentino, Son T. Le, S. Lee, D. Paine, A. Zaslavsky, S. Mirabella, M. Miritello, I. Crupi, A. Terrasi, and **D. Pacifici**, *Transient photoresponse and incident power dependence of high-efficiency germanium quantum dot photodetectors*, Journal of Applied Physics 112, 083103 (2012).
8. J. Feng, V. Siu, A. Roelke, V. Mehta, S. Rhieu, G.T.R. Palmore, and **D. Pacifici,** *Nanoscale Plasmonic Interferometers for Multispectral, High-Throughput Biochemical Sensing*, Nano Letters 12, 602–609 (2012).
9. J. Feng, V. Siu, A. Roelke, V. Mehta, S. Rhieu, G.T.R. Palmore, and **D. Pacifici,** *Plasmonic interferometry for biosensing*, IEEE Proc. Lester Eastman Conf. on High Performance Devices (LEC), August 7-9 (2012).
10. P. W. Flanigan, A. E. Ostfeld, Z. Ye, N. G. Serrino, A. Plummer, and **D. Pacifici**, *Plasmonic concentrators for enhanced light absorption in ultra-thin film organic solar cells*, IEEE Proc. Lester Eastman Conf. on High Performance Devices (LEC), August 7-9 (2012).
11. P. Liu, S. Cosentino, S. T. Le, S. Lee, D. Paine, A. Zaslavsky, S. Mirabella, M. Miritello, I. Crupi, A.Terrasi, and **D. Pacifici,** *Fast, high-efficiency Germanium quantum dot photodetectors,* IEEE Proc. Lester Eastman Conf. on High Performance Devices (LEC), August 7-9 (2012).
12. J. Feng, V. Siu, G.T.R. Palmore, **D. Pacifici**, *Determining the refractive index of dielectric materials via plasmonic interferometry*, in preparation (2014).
13. S. Cosentino, P. Liu, Son T. Le, S. Lee, D. Paine, A. Zaslavsky, S. Mirabella, M. Miritello, I. Crupi, A. Terrasi, and **D. Pacifici**, *High-efficiency silicon-compatible photodetectors based on Ge quantum dots,* Applied Physics Letters 98, 221107 (2011).
14. A. Ostfeld and **D. Pacifici**, *Plasmonic concentrators for enhanced light absorption in ultra-thin film organic photovoltaics*, Applied Physics Letters 98, 113112 (2011).
15. J. Weiner, H. Lezec, and **D. Pacifici**, "The Electrodynamics of Light Transmission for Subwavelength Single Apertures and Aperture Arrays," in *Imaging and Applied Optics Congress*, OSA Technical Digest (CD) (Optical Society of America), paper MTuC2 (2010).
16. P. N. Saeta, V. E. Ferry, **D. Pacifici**, J. N. Munday, H. A. Atwater, *How much can guided modes enhance absorption in thin solar cells*?, Optics Express 17, 20975–20990 (2009).

17. **D. Pacifici**, H. J. Lezec, L. A. Sweatlock, C. de Ruiter, V. Ferry, H. A. Atwater, *All-optical plasmonic modulators and interconnects*, in *Plasmonic Nanoguides and Circuits*, Ed. S. Bozhevolnyi, Pan Stanford Publishing Pte. Ltd., pp. 189–232 (2009).
18. M. J. Dicken, L. A. Sweatlock, **D. Pacifici**, H. J. Lezec, K. Bhattacharya, H. A. Atwater, *Electro-optic modulation in thin film barium titanate plasmonic interferometers*, Nano Letters 8, 4048–4052 (2008).
19. V. Ferry, L. A. Sweatlock, **D. Pacifici**, H. A. Atwater, *Plasmonic nanostructure design for efficient light coupling into solar cells*, Nano Letters 8, 4391–4397 (2008).
20. **D. Pacifici**, H. J. Lezec, L. A. Sweatlock, R. J. Walters, H. A. Atwater, *Universal optical transmission features in periodic and quasiperiodic hole arrays*, Optics Express 16, 9222–9238 (2008).
21. **D. Pacifici**, H. J. Lezec, H. A. Atwater, J. Weiner, *Quantitative determination of optical transmission through subwavelength slit arrays in Ag films: Role of surface wave interference and local coupling between adjacent slits*, Physical Review B 77, 115411 (2008).
22. J. Weiner, **D. Pacifici**, and G. Lévêque, "The Physics of Extraordinary Optical Transmission through Subwavelength Slits and Slit Arrays," in *Frontiers in Optics 2008/Laser Science XXIV/Plasmonics and Metamaterials/Optical Fabrication and Testing*, OSA Technical Digest (CD) (Optical Society of America, 2008), paper MWB3.
23. H. A. Atwater, K. Tanabe, K. Nakayama, V. Ferry, L. Sweatlock, and **D. Pacifici**, "Plasmonic Photovoltaics," in *Solar Energy: New Materials and Nanostructured Devices for High Efficiency*, (Optical Society of America, 2008), paper STuD3.
24. **D. Pacifici**, *Plasmonics: A shifting perspective*, Nature Photonics 1, 689 (2007).
25. **D. Pacifici**, H. J. Lezec, H. A. Atwater, *All-Optical modulation by plasmonic excitation of CdSe quantum dots*, Nature Photonics 1, 402–406 (2007).
26. H. Atwater, H. J. Lezec, J. A. Dionne, C. E. Ross, L. A. Sweatlock, D. Pacifici, K. Diest, M. Dicken, and V. Ferry, "Active Plasmonic Structures and Metamaterials," in *Frontiers in Optics 2007/Laser Science XXIII/Organic Materials and Devices for Displays and Energy Conversion*, OSA Technical Digest (CD) (Optical Society of America, 2007), paper FTuM6.
27. F. Iacona, A. Irrera, G. Franzò, **D. Pacifici**, I. Crupi, M. Miritello, C. Presti, F. Priolo, *Silicon-based light-emitting devices: properties and applications of crystalline, amorphous and Er-doped nanoclusters*, IEEE Journal of Selected Topics in Quantum Electronics 12, 1596 (2006).
28. R. Espiau de Lamaëstre, H. Bernas, **D. Pacifici**, G. Franzò and F. Priolo, *Evidence for a "dark exciton" state of PbS nanocrystals in a silicate glass*, Applied Physics Letters 88, 181115 (2006).
29. J. S. Biteen, **D. Pacifici**, N. S. Lewis, H. A. Atwater, *Enhanced radiative emission rate and quantum efficiency in coupled Si nanocrystal-nanostructured gold emitters*, Nano Letters 5, 1768 (2005).
30. **D. Pacifici**, L. Lanzanò, G. Franzò, F. Iacona, F. Priolo, *Revealing the sequential nature of the Si* nanocluster-*Er interaction by variable pulse-duration excitation*, Physical Review B 72, 45349 (2005).

31. A. Irrera, F. Iacona, G. Franzò, S. Boninelli, **D. Pacifici**, M. Miritello, C. Spinella, D. Sanfilippo, G. Di Stefano, P.G. Fallica, F. Priolo, *Correlation between electroluminescence and structural properties of Si nanoclusters*, Optical Materials 27, 1031 (2005).

32. F. Enrichi, G. Mattei, C. Sada, E. Trave, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, M. Prassas, M. Falconieri, E. Borsella, *Study of the energy transfer mechanism in different glasses co-doped with Si nanoaggregates an Er^{3+} ions*, Optical Materials 27, 904 (2005).

33. F. Enrichi, G. Mattei, C. Sada, E. Trave, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, M. Prassas, M. Falconieri, E. Borsella, *Evidence of energy transfer in an aluminosilicate glass co-doped with Si nanoaggregates and Er^{3+} ions*, Journal of Applied Physics 96, 3925 (2004).

34. M. Wodjak, M. Klik, M. Forcales, O.B. Gusev, T. Gregorkiewicz, **D. Pacifici**, G. Franzò, F. Priolo, and F. Iacona, *Sensitization of Er luminescence by Si nanoclusters*, Physical Review B 69, 233315 (2004).

35. **D. Pacifici**, G. Franzò, F. Iacona, A. Irrera, S. Boninelli, M. Miritello, and F. Priolo, *Rare-earth doped Si nanostructures for Microphotonics*, Mat. Res. Soc. Symp. Vol 817 L1.2.1 (2004).

36. F. Enrichi, G. Mattei, C. Sada, E. Trave, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, M. Prassas, M. Falconieri, and E. Borsella, *Optical and structural investigation on the energy transfer in a multicomponent glass co-doped with Si nanoaggregates and Er3+ ions,* Mat. Res. Soc. Symp. Vol. 817 L1.8.1 (2004).

37. A. Irrera, M. Miritello, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, D. Sanfilippo, G. Di Stefano, P.G. Fallica, *Electroluminescence properties of SiO_x layers implanted with rare earth ions*, Nuclear Instruments and Methods in Physics Research B 216, 222 (2004).

38. L. Dal Negro, P. Bettotti, M. Cazzanelli, L. Pavesi, and **D. Pacifici**, *Applicability conditions and experimental analysis of the variable stripe length method for gain measurements*, Optics Communications 229, 337 (2004).

39. F. Enrichi, G. Mattei, C. Sada, E. Trave, E. Borsella, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, and M. Prassas, *Luminescence properties of a multi-component glass co-implanted with Si and Er*, Solid State Phenomena 99–100, 37–40 (2004).

40. F. Enrichi, G. Mattei, C. Sada, E. Borsella, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, and M. Prassas, *Enhancement of Er^{3+} 1.54 μm Infrared Emission in a Si and Er Co-Implanted Multicomponent Glass*, European Conference on Optical Communications (ECOC-IOOC 2003) Proceedings vol. 3, p. 426 (2003).

41. F. Iacona, G. Franzò, **D. Pacifici**, A. Irrera, M. Miritello, D. Sanfilippo, G. Di Stefano, P.G. Fallica, and F. Priolo, *Er-Doped Si Nanocrystals as a Candidate for Optical Amplification*, European Conference on Optical Communications (ECOC-IOOC 2003) Proceedings vol. 4, p. 1068 (2003).

42. F. Priolo, A. Irrera, **D. Pacifici**, M. Miritello, G. Franzò, F. Iacona, D. Sanfilippo, G. Di Stefano, P.G. Fallica, *Dispositivi emettitori di luce basati su nanocristalli di silicio*, Fotonica2003 Proceedings b4.2 (April 2003).

43. **D. Pacifici**, G. Franzò, F. Iacona, S. Boninelli, A. Irrera, M. Miritello, and F. Priolo, *Er doped Si nanostructures*, Materials Science and Engineering B 105/1–3, 197–204 (2003).

44. N. Daldosso, G. Das, G. Dalba, S. Larcheri, R, Grisenti, G. Mariotto, L. Pavesi, F. Rocca, F. Priolo, G. Franzò, A. Irrera, M. Miritello, **D. Pacifici**, and F. Iacona, *Silicon nanocrystal*

Nucleation as a Function of the Annealing Temperature in SiO_x films, Mat. Res. Soc. Symp. Proc. Vol. 770, I1.3.1 (2003).

45. L. Dal Negro, M. Cazzanelli, N. Daldosso, L. Pavesi, F. Priolo, G. Franzò, **D. Pacifici**, and F. Iacona, *Time-resolved gain dynamics in silicon nanocrystals*, Mat. Res. Soc. Symp. Proc. Vol. 770, I3.4.1 (2003).
46. **D. Pacifici**, G. Franzò, F. Iacona, F. Priolo, *Coupling and cooperative up-conversion coefficients in Er-doped Si nanocrystals*, Mat. Res. Soc. Symp. Proc. Vol. 770, pp. 113–118, I6.8.1 (2003).
47. M. Forcales, M. Wojdak, M. A. J. Klik, T. Gregorkiewicz, O. B. Gusev, G. Franzò, **D. Pacifici**, F. Priolo, F. Iacona, *Si nanocrystals as sensitizers for Er PL in SiO_2*, Mat. Res. Soc. Symp. Proc. Vol. 770, p. 119-124, I6.9.1 (2003).
48. **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona, and L. Dal Negro, *Modeling and perspectives of the Si nanocrystals-Er interaction for optical amplification*, Physical Review B 67, 245301 (2003).
49. L. Dal Negro, M. Cazzanelli, L. Pavesi, S. Ossicini, **D. Pacifici**, G. Franzò, and F. Priolo, *Dynamics of stimulated emission in silicon nanocrystals*, Applied Physics Letters 82, 4636 (2003).
50. G. Franzò, S. Boninelli, **D. Pacifici**, F. Priolo, F. Iacona, and C. Bongiorno, *Sensitizing properties of amorphous Si clusters on the 1.54 μm luminescence of Er in Si-rich SiO_2*, Applied Physics Letters 82, 3871 (2003).
51. A. Irrera, **D. Pacifici**, M. Miritello, G. Franzò, F. Priolo, F. Iacona, D. Sanfilippo, G. Di Stefano, P.G. Fallica, *Light emitting devices based on silicon nanocrystals*, in *Towards the first silicon laser* edited by L. Pavesi, S. Gaponenko, L. Dal Negro, NATO Science Series vol 93 (Kluwer Academic Publishers, Dordrecht 2003) pp. 29–43.
52. L. Dal Negro, M. Cazzanelli, Z. Gaburro, P. Bettotti, L. Pavesi, F. Priolo, G. Franzò, **D. Pacifici**, F. Iacona, *Stimulated emission in silicon nanocrystals: Gain measurement and rate equation modelling*, in *Towards the first silicon laser* edited by L. Pavesi, S. Gaponenko, L. Dal Negro, NATO Science Series vol 93 (Kluwer Academic Publishers, Dordrecht 2003) pp. 145–164.
53. N. Daldosso, G. Dalba, R. Grisenti, L. Dal Negro, L. Pavesi, F. Rocca, F. Priolo, G. Franzò, **D. Pacifici**, and F. Iacona, *X-Ray Absorption study of light emitting Si nanocrystals*, Physica E – Low Dimensional Sysyems & Nanostructures 16, 321–325 (2003).
54. L. Dal Negro, M. Cazzanelli, N. Dal Dosso, Z. Gaburro, L. Pavesi, F. Priolo, **D. Pacifici**, G. Franzò, and F. Iacona, *Stimulated emission in Plasma Enhanced Chemical Vapour Deposited Silicon nanocrystals*, Physica E – Low Dimensional Sysyems & Nanostructures 16, 297–308 (2003).
55. **D. Pacifici**, G. Franzò, F. Iacona, and F. Priolo, *Amorphization and recrystallization of ion implanted Si nanocrystals probed through their luminescence properties*, Physica E – Low Dimensional Sysyems & Nanostructures 16, 404–409 (2003).
56. A. Irrera, **D. Pacifici**, M. Miritello, G. Franzò, F. Priolo, F. Iacona, D. Sanfilippo, G. Di Stefano, and P.G. Fallica, *Electroluminescence properties of light emitting devices based on silicon nanocrystals*, Physica E – Low-Dimensional Systems & Nanostructures 16, 395–399 (2003).

57. **D. Pacifici**, A. Irrera, G. Franzò, M. Miritello, F. Iacona, and F. Priolo, *Erbium-doped Si nanocrystals: optical properties and electroluminescent devices*, Physica E – Low Dimensional Sysyems & Nanostructures 16, 331–340 (2003).

58. L. Dal Negro, M. Cazzanelli, Z. Gaburro, P. Bettotti, L. Pavesi, **D. Pacifici**, G. Franzò, F. Priolo, F. Iacona*, Optical gain and stimulated emission in silicon*, Mat. Res. Soc. Symp. Proc. Vol. 738, p. 233-238, G8.8.1 (2003).

59. A. Irrera, F. Iacona, **D. Pacifici**, M. Miritello, G. Franzò, D. Sanfilippo, G. Di Stefano, P.G. Fallica, and F. Priolo, *Tuning of the electroluminescence from Si nanocrystals through the control of their structural properties*, Mat. Res. Soc. Symp. Proc. Vol. 737, p. 819–824, F11.9 (2003).

60. F. Priolo, F. Iacona, **D. Pacifici**, A. Irrera, M. Miritello, G. Franzò, D. Sanfilippo, G. Di Stefano, and P.G. Fallica, *Electroluminescent devices based on Er-doped Si nanoclusters*, Mat. Res. Soc. Symp. Proc. Vol. 737, p. 761-766, F9.3 (2003).

61. L. Dal Negro, B. Danese, Z. Gaburro, P. Bettotti, L. Pavesi, F. Iacona, G. Franzò, **D. Pacifici**, F. Priolo, *Enhanced emission cross section and VSL analysis of erbium coupled silicon nanocrystals*. In: Lasers and Electro-Optics Europe, 2003. CLEO/Europe Conference (2003).

62. **D. Pacifici**, G. Franzò, F. Iacona, F. Priolo, *Erbium-doped silicon nanoclusters*. In: Conference Proceedings – Italian Physical Society. Vol. 84, pp. 507–522, Editrice Compositori; 1999 (2003).

63. L. Pavesi, L. Dal Negro, N. Daldosso, Z. Gaburro, M. Cazzanelli, F. Iacona, G. Franzò, **D. Pacifici**, F. Priolo, S. Ossicini, M. Luppi and E. Degoli "*Will silicon be the photonics material of the third millennium?*" Proceedings of the 26th International Conference on the Physics of Semiconductors vol. 171, pp. 261–268 (Held in Edinburgh 2002), (2003).

64. L. Dal Negro, M. Cazzanelli, Z. Gaburro, L. Pavesi, **D. Pacifici**, F. Priolo, G. Franzò, and F. Iacona, *Optical gain in PECVD grown silicon nanocrystals*, in *Optical properties of nanocrystals* edited by Z. Gaburro, Proceedings of SPIE vol. 4808, 13-27 (2002).

65. L. Rebohle, T. Gebel, J. von Borany, W. Skorupa, M. Helm, **D. Pacifici**, G. Franzò, F. Priolo, *Transient behavior of the strong violet electroluminescence of Ge-implanted SiO_2 layers*, Applied Physics B 74, 53 (2002).

66. F. Iacona, G. Franzò, E.C. Moreira, **D. Pacifici**, F. Priolo, *Luminescence from Si Nanocrystals and Er ions embedded in resonant cavities*, Solid State Phenomena 82–84, 617–622 (2002).

67. F. Iacona, G. Franzò, E.C. Moreira, **D. Pacifici**, A. Irrera, F. Priolo, *Luminescence properties of Si nanocrystals embedded in optical microcavities*, Materials Science and Engineering C 19, 377–381 (2002).

68. F. Iacona, **D. Pacifici**, A. Irrera, M. Miritello, G. Franzò, F. Priolo, D. Sanfilippo, G. Di Stefano, and P.G. Fallica, *Electroluminescence at 1.54 μm in Er-doped Si nanocluster-based devices*, Applied Physics Letters 81, 3242 (2002).

69. A. Irrera, **D. Pacifici**, M. Miritello, G. Franzò, F. Priolo, F. Iacona, D. Sanfilippo, G. Di Stefano, and P.G. Fallica, *Excitation and de-excitation properties of silicon quantum dots under electrical pumping*, Applied Physics Letters 81, 1866 (2002).

70. **D. Pacifici**, E.C. Moreira, G. Franzò, V. Martorino, F. Priolo, and F. Iacona, *Defect production and annealing in ion-irradiated Si nanocrystals*, Physical Review B 65, 144109 (2002).

71. L. Pavesi, L. Dal Negro, M. Cazzanelli, C. Mazzoleni, Z. Gaburro, F. Priolo, G. Franzò, **D. Pacifici**, A. Irrera, F. Iacona, "*Towards a silicon laser*," Highlights INFM (2000/2001).

72. G. V. Prakash, N. Daldosso, E. Degoli, F. Iacona, M. Cazzanelli, Z. Gaburro, G. Pucker, P. Dalba, F. Rocca, E.C. Moreira, G. Franzò, **D. Pacifici**, F. Priolo, C. Arcangeli, A.B. Filonov, S. Ossicini, L. Pavesi, *Structural and optical properties of PECVD grown Silicon nanocrystals*, J. Nanosci. Nanotech. 1, 159 (2001).

73. F. Priolo, G. Franzò, F. Iacona, **D. Pacifici**, V. Vinciguerra, *Excitation and non-radiative de-excitation processes in Er-doped Si nanocrystals*, Materials Science and Engineering B 81, 9 (2001).

74. G. Franzò, E.C. Moreira, **D. Pacifici**, F. Priolo, F. Iacona, C. Spinella*, Ion Beam Synthesis of Undoped and Er-Doped Si Nanocrystals*, Nuclear Instruments and Methods in Physics Research B 175–177, 140 (2001).

75. F. Priolo, G. Franzò, **D. Pacifici**, V. Vinciguerra, F. Iacona, A. Irrera, *Role of energy transfer in the optical properties of undoped and Er-doped interacting Si nanocrystals*, Journal of Applied Physics 89, 264 (2001).

76. F. Priolo, G. Franzò, F. Iacona, E.C. Moreira, **D. Pacifici**, *Luminescence from Si Nanocrystals and Er3+ Ions Embedded in Resonant Cavities*, Solid State Phenomena 82–84, pp. 617–622 (2001).

77. G. Franzò, **D. Pacifici**, V. Vinciguerra, F. Priolo, F. Iacona, *Er^{3+} ions–Si nanocrystals interactions and their effects on the luminescence properties*, Applied Physics Letters 76, 2167 (2000).

[Research Report, Google Scholar (06/13/2014):
(1) Citations: **3,535**; (2) h-index (Hirsch factor): **27]**

PATENTS

The following provisional patents have been filed by the Brown Technology Venture Office:

1. Pacifici, D. 2011. Nanoscale Plasmonic Interferometers for Multispectral, High-Throughput Biochemical Sensing. U.S. Patent Application 61/546,435, filed October 2011. Patent Pending.
2. Pacifici, D. High-Efficiency Silicon-Compatible Photodetectors Based on Germanium Quantumdots and Ge/Si Hetero-Nanowires. International Patent Application PCT/US12/40809, filed June 2012, claiming priority from U.S. Application 61/492,589, filed June 2011. Patent Pending.
3. Plasmonic interferometry coupled to dye chemistry for enhanced selectivity, submitted to Brown TVO (2012)

The following patents have been published:

1. Domenico PACIFICI, Henri LEZEC, Tayhas PALMORE, Vince SIU, Vihang MEHTA, Alec ROELKE, Steve RHIEU, Jing FENG. SYSTEMS AND METHODS ENABLING HIGH-THROUGHPUT, REAL TIME DETECTION OF ANALYTES. WO 2013056137 (2013/4/19) – Priority Data: 61/546,435 12.10.2011 US
   61/662,048 20.06.2012 US

61/581,951 30.12.2011 US

2. Domenico PACIFICI, Alexander ZASLAVSKY, Son LE. HIGH-EFFICIENCY SILICON-COMPATIBLE PHOTODETECTORS BASED ON GE QUANTUMDOTS AND GE/SI HETERO-NANOWIRES. WO 2012167282 (2012/12/7) – Priority Data: 61/492,589 02.06.2011 US

INVITED TALKS (International Conferences)

IEEE NANOTECHNOLOGY MATERIALS AND DEVICES CONFERENCE, Aci Castello, Italy
Sponsored by the EU FP7 project WATER 2014
Plasmonic Interferometry for Biomedical Applications.

MATERIALS RESEARCH SOCIETY, San Francisco, CA, USA
Spring Meeting, Symposium KK: Resonant Optics – Fundamentals and Applications 2014
Plasmonic Interferometers for Biochemical Sensing and Optical Coherence Measurements.

MATERIALS RESEARCH SOCIETY, San Francisco, CA, USA
Spring Meeting, Symposium II: Emerging Nanophotonic Materials and Devices 2014
Plasmonic Interferometry: Physics and Applications.

30TH COURSE NANO-STRUCTURES FOR OPTICS AND PHOTONICS, Erice, Italy
Ettore Majorana Foundation and Center for Scientific Culture 2013
Plasmonic Interferometry for Photovoltaics and Biosensing Applications.

MATERIALS RESEARCH SOCIETY, Boston, USA
Fall Meeting 2012
Germanium Nanostructures Coupled to Plasmonic Concentrators for Efficient Silicon-compatible Optoelectronics.

OPTO SPIE PHOTONICS WEST, San Francisco, USA
Photonic and Phononic Properties of Engineered Nanostructures II 2012
Plasmonic interferometry: a versatile tool for high-throughput biochemical sensors and energy-efficient thin-film solar cells.

EUROPEAN OPTICAL SOCIETY (EOS), Capri, Italy
3rd Topical Meeting on Optical Microsystems & 1st Topical Meeting on Lasers 2009
Applied Plasmonics: surface waves for sensing, switching and energy harvesting.

MATERIALS RESEARCH SOCIETY, San Francisco, CA, USA
Spring Meeting 2009
Active Plasmonics: physics and applications.

NANOMETA 2009, THE EUROPEAN RESEARCH SOCIETY, Tirol, Austria
The 1st European Topical Meeting on Nanophotonics and Metamaterials 2009
Active Plasmonic Devices: novel approaches to the generation and manipulation of surface plasmons.

METAMATERIALS 2008, Pamplona, Spain
2nd International Congress on Advanced Electromagnetic Materials in Microwave and Optics 2008
Active Plasmonic Components and Metamaterials.

PQE, PHYSICS OF QUANTUM ELECTRONICS, Snowbird, UT, USA
The 38th Winter Colloquium on the Physics of Quantum Electronics 2008
Plasmons in slit and hole arrays: role of coherence and short range order for modulators and solar cells.

MATERIALS RESEARCH SOCIETY, San Francisco, CA, USA
Spring Meeting 2004
Rare-earth doped silicon nanostructures for Microphotonics.

EUROPEAN MATERIALS RESEARCH SOCIETY, Strasbourg, France
Spring Meeting 2002
Microcavities and electroluminescent devices based on silicon nanocrystals and rare-earth doped nanocrystals.

SOCIETÀ ITALIANA DI FISICA, Milano, Italy
LXXXVII Congresso nazionale 2001
Photoluminescence from silicon nanocrystals and erbium ions.

COLLOQUIA

UNIVERSITY OF CATANIA, Catania, Italy
Scuola Superiore di Catania - Invited talk 2013
Plasmonic Interferometry: Physics and Applications.
[A video of the full seminar can be viewed here:
http://www.youtube.com/watch?v=1rsn6yLW3W8 **]**

UNIVERSITY OF CATANIA, Catania, Italy
Department of Physics - Invited talk 2013
Plasmonic Interferometry for Photovoltaics and Biosensing Applications.

BROWN UNIVERSITY, Providence, RI, USA
IMNI Brown Bag Seminars - Invited talk 2012
Plasmonics: light concentrators and interferometers for ultra-thin-film photovoltaics and biochemical sensing.

CITY UNIVERSITY OF NEW YORK, New York, NY, USA
CUNY Graduate Center Photonics Colloquium 2010
Applied Plasmonics for Optical Communications, Energy Harvesting and Sensing Applications.

BROWN UNIVERSITY, Providence, RI, USA
Energy Science Seminar - Invited talk 2010
Plasmonic Interferometers for Energy Harvesting.

PRINCETON UNIVERSITY, Princeton, NJ, USA
Department of Electrical Engineering 2009
Plasmonics for Information, Energy and Environmental applications.

BROWN UNIVERSITY, Providence, RI, USA
Invited talk 2009
Active Plasmonics for Optical Communication, Photovoltaics and Sensing Applications.

BELL LABS, Murray Hill, NJ, USA
Invited talk 2009
Plasmonics: a route toward improved efficiency in thin film solar cells.

ICFO-THE INSTITUTE OF PHOTONIC SCIENCES, Barcelona, Spain
ICFO Colloquium 2009
Active Plasmonics for Optical Communication, Photovoltaics and Sensing Applications.

UNIVERSITY OF DELAWARE, Newark, DE, USA
ECE Lecturer Series, Electrical and Computer Engineering 2008
Active Plasmonics for Optical Communication and Photovoltaics.

KAIST, Daejeon, Republic of Korea
Department of Physics 2008
Active plasmonics: ultra low-power all-optical modulators, efficient solar cells, and beyond.

GEORGIA TECH, Atlanta, GA, USA
School of Electrical and Computer Engineering 2008
Active plasmonics: from ultra low-power all-optical modulators to efficient solar cells.

BOSTON UNIVERSITY, Boston, MA, USA
ECE Colloquium, Department of Electrical and Computer Engineering 2006
Si-based microphotonics: light sources and plasmonic devices.

5. RESEARCH GRANTS

A. CURRENT GRANTS

2014-2015 Seed Award, *Multispectral Photoplethysmography for 3D Imaging and Quantitative Assessment of Blood Flow and Oxygen Content in Bone*
PI: Domenico Pacifici. Co-PI: Roy Aaron.
Award amount: $80,000. Total period covered: 06/01/14-05/30/15.

2013-2015 JDRF (Juvenile Diabetes Research Foundation), *Plasmonic Interferometry: A New Tool for Real-Time Detection of Insulin*
Co-PI: Domenico Pacifici. PI: G. Tayhas R. Palmore.
Award amount: $1,000,000. Total period covered: 06/01/13-05/31/15.

2013-2014 Seed Award, *Solar Power By Optical Frequency Rectification With Plasmonic Concentrators Coupled to Junctions of Doped Mott Insulators*
Co-PI: Domenico Pacifici, Gang Xiao, Vladan Mlinar. PI: Brad Marston.
Award amount: $80,000. Total period covered: 07/01/13-06/30/14.

2012-2015 NSF-CBET, *Multispectral plasmonic interferometry: a new tool for high-throughput, real-time detection of cytokines*
PI: Domenico Pacifici. Co-PI: G. Tayhas R. Palmore.
Award amount: $593,999. Total period covered: 03/01/12-03/01/15.

2012-2015 NSF-DMR, *Germanium nanostructures for efficient silicon-compatible optoelectronics*
PI: Domenico Pacifici. Co-PI: Alexander Zaslavsky.
Award amount: $400,000. Total period covered: 06/01/12-06/01/15.

2012-2012 ONR, *2012 Lester Eastman Conference (LEC) on High Performance Devices to be held at Brown University 7 – 9 August 2012*
PI: Domenico Pacifici.
Award amount: $19,999.90. Total period covered: 07/15/12-21/06/13.

2011 FOUNDATION BLANCEFLOR BONCOMPAGNI-LUDOVISI AWARD, Stockholm, Sweden.
PI: Salvatore Cosentino (Visiting Student in Pacifici's Group).
Award amount: SEK75,000. Total period covered: 9/01/11-4/30/12.

2011-2012 DORIS M. AND NORMAN T. HALPIN PRIZE FOR INTERDISCIPLINARY SENIOR CAPSTONE PROJECTS
PI: Christian Franck, Co-PI: Domenico Pacifici. Award recipient: Anastassia Astafieva
Award amount: $750 student prize; $2,500 research fund. Total period covered: 10/14/11-5/01/12.

B. PROPOSALS COMPLETED

2010 SALOMON AWARD, Brown University**,** *High-throughput, polychromatic, compact interferometric sensor array for label-free detection of chemical and biological analytes*.
PI: Domenico Pacifici.
Award amount: $15,000. Total period covered: 1/19/10-6/30/11.

C. PROPOSALS SUBMITTED

DOE Early Career Award, *Quasipersiodic plasmonic concentrators for high-efficiency energy conversion in ultra-thin film solar cells*
PI: Domenico Pacifici.
Award amount: $750,000. Total period covered: 06/01/13-01/31/18.

ENI (Ente Nazionale Idrocarburi) AWARD 2012, Renewable and Non-Conventional Energy Prize (Upon invitation)
Quasiperiodic Plasmonic Concentrators for High Efficiency Energy Conversion in Thin Film Solar Cells
PI: Domenico Pacifici.
Award amount: Euros 200,000. Total period covered: 02/01/12-01/31/15.

EPA-SBIR, *Nanophotonic devices for a miniaturized dioxin sensor*
PI: Edel Minogue (Ryon Technologies). Co-PI: Domenico Pacifici, Joseph D. Geiser
Award amount: $26,342. Total period covered: 03/01/12-08/31/12.

RI STAC, *Nanophotonic Devices for Miniaturized Environmental Sensors*
PI: Domenico Pacifici. Co-PI: Joseph D. Geiser, Edel Minogue (Ryon Technologies)
Award amount: $70,000. Total period covered: 01/01/12-12/31/12.

NSF-SBIR, *Plasmonic-Enhanced Rydberg Spectroscopy for Real-time Air-pollutant Monitoring*
PI: Joseph D. Geiser (Ryon Technologies). Co-PI: Domenico Pacifici, Edel Minogue

Award amount: $50,000. Total period covered: 07/01/12-12/31/12.

6. SERVICE

A. TO THE UNIVERSITY

- Committee Member, Development of New Website for the School of Engineering, Brown University (2009-2011)
- Committee Member, Proposal for a new Institute for Energy Science, Brown University, Proposal Co-author (2009-2011)
- Proposal reviewer, School of Engineering, Brown University (2010).
- Instructor, Nanoscale Fabrication and Characterization Workshops, Brown University Microelectronics and Electron Microscopy Facilities, March-April 2010, Providence, RI (Organizer: Prof. R. Zia, Instructors: Prof. D. Pacifici, Prof. R. Zia, Eng. M. Jibitsky, Eng. A. McCormick)
- Graduate Research Application Screening, Brown University, School of Engineering.
- Organizer, "Electronic and Photonics" seminar series, Brown University, School of Engineering (2009-2011)
- Graduate Students Preliminary Examination, Participant. (2009-2011)
- Developed a new course, "The Physics of Solar Cells," at the undergraduate and graduate levels.
- Revamped a junior-level "Design and Fabrication of Semiconductor Devices" course with focus on semiconductor solar cell fabrication.
- Member and contributor, "Science Friday" meetings, STEM faculty group co-sponsored by the Sheridan Center for Teaching and Learning and the Science Center at Brown University.
- Run for the Faculty Executive Committee (FEC), junior faculty slate (2010)

B. TO THE PROFESSION

- Organizing Committee Member, Joint Fall Meeting of the New England Sections of the APS and the AAPT, Nanobiophysics in the 21st Century, October 2010, Brown University
- Program Committee Member, Photonics and Phononic Crystal Materials and Devices, OPTO SPIE Photonics West, January 2009, 2010, 2011, 2012.
- International Program Committee Member, IASTED International Conference on Solar Energy (SOE 2010, 2011), Banff, Alberta, Canada (2010, 2011)
- Selected as Local Arrangements Chair, IEEE Biennial Lester Eastman Conference on High Performance Devices, to be held at Brown University in August 2012
- Reviewer, Pilot Funding for New Research (Pfund) (2009)
- Reviewer, Science Center programs of the U.S. Department of State, U.S. Civilian Research and Development Foundation (CRDF) (2010)
- Reviewer, NSF panel evaluating photonic proposals submitted to the ECCS Division (2011-2012)
- Reviewer, NSF panel evaluating proposals submitted to the DMR Division (2012)
- Reviewer, DOE Office of Science Graduate Fellowship (SCGF) Program's 2012
- Peer Reviewer for the following journals: Nature Photonics, NanoLetters, Optics Letters, Optics Express, Physical Review Letters, Applied Optics, Physical Review B, Journal of the Optical Society of America, Applied Physics Letters, Solid State Electronics.

C. TO THE COMMUNITY

- Speaker, Engineers Week 2010, Brown University, Talk on "Engineering of Photography" (February 2010). Showcased photographs and personal point of view in photography.

- Teaching outreach, Presented a talk on "The Power of The Sun" (with solar cell demos) at the Martin Luther King (MLK) Elementary Science Conference (June 2010), organized within the GK-12 program at Brown University. Served as judge for the Science fair at MLK.
- Organizer of guided tours and solar cell demos for elementary school students.
- Lab Tour Training for Staff Members of the School of Engineering (2013).

7. ACADEMIC HONORS & AWARDS

BROWN UNIVERSITY
Research Seed Funding 2014
Created to help faculty compete more successfully for large-scale, interdisciplinary, multi-investigator grants.

BROWN UNIVERSITY
Henry Merritt Wriston Fellowship 2013
"For his contributions to excellence in teaching and for the devotion to the intellectual development of both graduate and undergraduate students."

BROWN UNIVERSITY
Research Seed Funding 2013
Created to help faculty compete more successfully for large-scale, interdisciplinary, multi-investigator grants.

BROWN UNIVERSITY 'S SCHOOL OF ENGINEERING AND TAU BETA PI
Dedicated Faculty Award 2012
"For enriching the undergraduate education experience. Selected for demonstrating superior teaching, dedication, and involvement both in and out of the classroom."

BROWN UNIVERSITY
Richard B. Salomon Faculty Research Award 2010
Established to support excellence in scholarly work by providing funding for selected faculty research projects deemed to be of exceptional merit.

STMICROELECTRONICS, Catania, Italy
Best Ph.D. Thesis Award 2004
Award for the best Ph.D. thesis performed in collaboration with industry. STMicroelectronics is a global leader in developing and delivering system-on-chip and semiconductor solutions across the spectrum of microelectronics.

ACCADEMIA GIOENIA, Catania, Italy
Best Master of Science Thesis Award 2001
The Accademia Gioenia is a research society founded in 1824 that includes Italian scientists, like Nobel laureate Rita Levi Montalcini, as honorary members. The academy promotes the studies of natural phenomena in order to contribute to the progress of science.

RESEARCH DISTINCTIONS

- In a team effort with two Professors at the Rhode Island School of Design (RISD), i.e. Prof. Laura Briggs and Prof. Jonathan Knowles, Prof. Pacifici proposed developing, manufacturing, and marketing Solar Sail, an affordable, easily replicable, textile photovoltaic system. The Brown-RISD team was among five finalists to be recognized by the 2013 Rhode Island Foundation Innovation Fellows selection committee for the projects' merit and commercialization potential.
- Honorable Mention for Tech Innovation from the National Collegiate Inventors and Innovators Alliance (NCIIA) for the SPIT'nIT technology (Surface Plasmon Interterferometric Technology for non-Invasive Testing of glucose in saliva), May 2012
- Research featured in **Nature Photonics**, "Research Highlights," vol. 6, p. 139 (2012)
- Paper selected for the March 28, 2011 issue of Virtual Journal of Nanoscale Science & Technology - "Plasmonic concentrators for enhanced light absorption in ultrathin film organic photovoltaics," published in Applied Physics Letters 98, 113112 (2011).
- Research featured in **Nature Photonics**, "Research Highlights," vol. 3, pp. 4-5 (2009)
- Research featured in **Nature Photonics**, "News & Views," vol. 1, p. 368 (2007)
- Research featured in **Nature Physics**, "Research Highlights," vol. 3, p. 443 (2007)
- Article selected by **Nature Photonics** for the "First Year (2007) Highlights," (2007)
- Article featured as "Cover story" in **Nature Photonics**, vol. 1, N. 2 (2007)

8. TEACHING

ENGN 1680: Design and Fabrication of Semiconductor Devices Spring 2013
Enrollment: 10 Students.

ENGN 0510: Electricity and Magnetism Fall 2012
Enrollment: 116 Students.

ENGN 1931A: The Physics of Solar Cells Spring 2012
Enrollment: 19 Students.

ENGN 2980: Special Projects, Reading, Research and Design Spring 2012
Enrollment: 3 Graduate Students (Jing Feng, Patrick Flanigan, Pei Liu).

ENGN 0510: Electricity and Magnetism Fall 2011
Enrollment: 127 Students.

ENGN 1970: Independent Studies in Engineering Fall 2011
Enrollment: 1 Undergraduate Student (Kaan Gunay).

ENGN 2980: Special Projects, Reading, Research and Design Fall 2011
Enrollment: 2 Graduate Students (Jing Feng, Patrick Flanigan).

PHYS 2980: Research in Physics Fall 2011
Enrollment: 2 Graduate Students (Pei Liu, Zhen Ye).

ENGN 1680: Design and Fabrication of Semiconductor Devices Spring 2011
Enrollment: 15 Students.

ENGN 1970: Independent Studies in Engineering Spring 2011
Enrollment: 5 Undergraduate Students (Tim Dingman, Kaan Gunay, Vihang Mehta, Aminy Ostfeld, Natalie Serrino).

ENGN 2980: Special Projects, Reading, Research and Design Spring 2011
Enrollment: 1 Graduate Student (Jing Feng).

PHYS 2980: Research in Physics Spring 2011
Enrollment: 2 Graduate Students (Pei Liu, Zhen Ye).

ENGN 0510: Electricity and Magnetism Fall 2010
Enrollment: 88 Students.

ENGN 2980: Special Projects, Reading, Research and Design Fall 2010
Enrollment: 1 Graduate Student (Jing Feng).

PHYS 2980: Research in Physics Fall 2010
Enrollment: 1 Graduate Student (Pei Liu).

ENGN 1970: Independent Studies in Engineering Fall 2010
Enrollment: 2 Undergraduate Students (Timothy Dingman, Vihang Mehta).

ENGN 1931A: The Physics of Solar Cells Spring 2010
Enrollment: 13 Students.

ENGN 0510: Electricity and Magnetism Fall 2009
Enrollment: 112 Students.

- Currently, advisor of **six graduate students**: Pei Liu, Jing Feng, Patrick Flanigan, Peng Zhang, Son T. Le, and Vince Siu. (Peng Zhang and Son T. Le co-advised with Prof. A. Zaslavsky, and Vince Siu co-advised with Prof. G. Tayhas R. Palmore).
- and **six undergraduate students** (Kaan Gunay, Matthew Breuer, Abigail Plummer, Drew Morrill, Emily Toomey, and Oussama Fadil).

Graduate Research Advisor for:

1. Pei Liu, Ph.D. in Physics (2010-present)
2. Jing Feng, Ph.D. in Electrical Engineering (2010-present)
3. Patrick Flanigan, Ph.D. in Electrical Engineering (2011-present)
4. Son T. Le, Ph.D. in Physics, co-advised with Prof. Alexander Zaslavsky (2010-present)
5. Zhen Ye, Ph.D. in Physics (Jan.-Dec. 2011)
6. Peng Zhang, Ph.D. in Physics, co-advised with Prof. Alexander Zaslavsky (2012-present)
7. Vince Siu, Ph.D. in Biomedical Engineering, co-advised with Prof. G. Tayhas R. Palmore (Graduated, 2013)

Undergraduate Senior Honors Thesis Advisor for:

1. Alec Roelke, Computer Engineering (2009-2012)
2. Aminy Ostfeld, Electrical Engineering (2009-2011)

3. Tim Dingman, Engineering-Physics (2010-2011)
4. Kaan Gunay, Mechanical Engineering (2011-2013)
5. Drew Morrill (2012-2013) "Leallyn B. Clapp Prize for Outstanding Senior Honors Thesis in Chemical Physics."

Visiting Graduate Student Advisor for:

1. Salvatore Cosentino (University of Catania, Summer 2010, Fall 2011, Spring 2012)

Undergraduate Teaching and Research Awards (UTRA):

1. Abigail Plummer, 2012 Summer UTRA
2. Kaan Gunay, 2012 Summer UTRA
3. Alec Roelke, 2011 Summer UTRA
4. Stephen Palazola, 2011 Summer UTRA
5. Aminy Ostfeld, 2010 Summer UTRA
6. Natalie Serrino, 2010 Fall UTRA

Other Undergraduate Awards:

1. Aminy Ostfeld, 2010 Tau Beta Pi Scholarship
2. Anastassia Astafieva, 2011–2012 Doris M. and Norman T. Halpin Prize for Interdisciplinary Senior Capstone Projects
3. Kaan Gunay, recipient of the 2012 Maurice R. Seguin Winter Stipend
4. Abigail Plummer, winner of the 2014–2015 Astronaut Scholarship Foundation's Scholarship

Host for Visiting Scientist:

1. Robert J. Walters, Integrated Plasmonics Corporation (2012)

Advisor for the following high school students who performed research in the Pacifici Labs:

1. Michael Zaslavsky (Summer internship, 2012)
2. Clayton Inman (Summer internship, 2012, 2013)