MOHAMED SWILLAM

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The American University in Cairo.
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PROFESSIONAL EXPERIENCE

January 2020 -Now

- Chair, Department of Physics, School of Science and Engineering, The American University in Cairo.

July 2020- Now

- Professor, Department of Physics, School of Science and Engineering, The American University in Cairo.

July 2016- June 2020

- Associate Professor with tenure, Department of Physics, School of Science and Engineering, The American University in Cairo.

September 2019- January 2020

- Director of the Nanotechnology Program, School of Sciences and Engineering, The American University in Cairo.

December 2018- September 2019

- Principle Optical Research Engineer, Optical sensing and metrology, ASML Holding N. V. , Wilton, Ct, USA. (as a sabbatical leave)

September 2011-June 2016

- Assistant Professor, Department of Physics, School of Science and Engineering, The American University in Cairo.

December 2013-January 2017

- Associate Chair, Department of Physics, School of Science and Engineering, The American University in Cairo.

June 2020. August 2021.

- Visiting Professor, Department of Physics , Yale University, Connecticut, USA.

June 2017. August 2017

- Visiting Professor, ECE Department, University at Buffalo, SUNY, USA.

June 2016. August 2016

- Visiting Professor, ECE Department, University at Buffalo, SUNY, USA.

June 2015. August 2015

- Visiting Professor, ECE Department, University at Buffalo, SUNY, USA.

June 2013. August 2014

- Visiting Professor, ECE department and Institute of Optical Sciences, University of Toronto, Canada.

July 2013. August 2013

- Visiting Professor, ECE Department, McMaster University, Canada.

June. 2013-July 2013

- Visiting Professor, Department of Physics, University of Toronto, Canada.

August 2012-September 2012

- Visiting Professor, University of Toronto, Canada.

June 2012-August 2012

- Visiting Professor, Department of Physics, University of Toronto, Canada.

October 2009 –September 2011

- Postdoctoral Fellow, Department of Electrical and Computer Engineering and the Institute of Optical Sciences, University of Toronto.
- Sessional lecturer at the School of Computational science and Engineering, McMaster University.

May 2009 – October 2009

Postdoctoral Fellow, Electrical and Computer Dept., Faculty of Engineering, McMaster University.

EDUCATION

January 2005 – April 2009.

Ph.D. from Electrical and Computer Dept., Faculty of Engineering, McMaster University.

Research area: Design, modeling and optimization of active and passive photonic and nanophotonic devices.

GPA: 4/4. (A+ in all the courses)

September 2001 – July 2004

M. Sc. in Electronic Engineering, Ain Shams University, Cairo, Egypt.

September 1995 – August 2000:

Bachelor of Science in Electrical Engineering (B. Sc.) with honors

Major: Electronics & Communications Engineering.

Ain Shams University, Cairo, Egypt.

Grade: Distinction.

B.Sc Project entitled: " Design of WDM Optical Communication System"

PUBLICATIONS

Patents:

1. M Swillam, SR Huisman, JL Kreuzer, "OVERLAY MEASUREMENT SYSTEM USING LOCK-IN AMPLIFIER TECHNIQUE," US Patent App. 17/782,622, 2023
2. M. A. Swillam, M. Desouky, and A. M. Mahmoud, "Silicon based mid-ir super absorber using hyperbolic metamaterial, US Patent App. 17/065,329,2021.
3. M.A. Swillam, M. A. Abdel-Galil, and Y. Ismail, "Infrared subwavelength focusing in silicon and energy harvesting devices," US Patent 10,948,627, 2021

4. Ilse VAN WEPEREN, Arjan Johannes Anton BEUKMAN, Mohamed A. Swillam, Stephen Roux, "Monolithic particle inspection device", WO2021259646A1, 2022.

5. Mohamed SWILLAM, Stephen Roux, Justin Kreuzer, "Spectrometric metrology systems based on multimode interference and lithographic apparatus," WO2022012927A1, 2022.
6. M. A Swillam, T Elazhary, S Roux, Y Shmarev, Optical Designs Of Miniaturized Overlay Measurement System, US Patent Wo2021151775a1, 2023
7. M. Reijnders, M A. Swillam, Lithographic Apparatus, Metrology Systems, Illumination Sources And Methods Thereof, US Patent Us201,962,954,836 P 2023
8. M Swillam, S Huisman, Jl Kreuzer, Overlay Measurement System Using Lock-In Amplifier Technique, Us Patent Wo2021110416a1 2021.
9. M Swillam, T Elazhary, S Roux, Y Lin, J Kreuzer, Lithographic Apparatus, Metrology Systems, Phased Array Illumination Sources And Methods Thereof, Us Patent 20,210,095,957 2021
10. I Dani Setija, A Den Boef, M. A. Swillam, A Beukman, Metrology Systems, Coherence Scrambler Illumination Sources And Methods Thereof, Us Patent Us201,962,907,049 P 2021
11. M Swillam, S Roux, T Elazhary, A Den Boef , On Chip Sensor For Wafer Overlay Measurement, Us Patent Us201,962,893,256 P2021
12. T Elazhary, M. A, Swillam, On Chip Wafer Alignment Sensor, Patent Nl2,025,987 A 2021.
13. M. A. Swillam. Mohamed Tawfik A. Elazhary, S. Rouxy. Lin, J. Kreuzer, Metrology Systems and Phased Array Illumination Sources, Wo2021058571a1, 2021.

Books:

14. M. A. Swillam, *Photonics Optimization,* Lambert Academic publications, Berlin, Germany. 2013. ISBN 978-3-8484-2555-6.

15. M. A. Swillam, *Fundamentals of Nanophysics: with Applications to Electronics and Photonics*, El Sevier. To be finished by June 2023.

16. M.A. Swillam et.al., *"Optical interconnects finally seeing the ligh through silicon photonics"* Institute of physics (IoP) Concise Physics e-book, November 2023.

Book Chapters:

17. M. A. Swillam, *"FDTD for Photonics and Nanophotonics", in FDTD for Nanotechnology,* CRC publications. 2013, second edition 2017.

Refereed Journal Papers:

18. A. E Alsayed, A. M Ghanim, A. Yahia, M. A Swillam, "Giant localized electromagnetic field of highly doped silicon plasmonic nanoantennas," Scientific Reports 13, (1) , 5793, 2023.

19. M. AA Abouelatta, M. A Swillam, A. R Davoyan, A. M Mahmoud, “One-way light flow by spatio-temporal modulation,” Optics Express Vol. 31, Issue 9, pp. 14278-14285 (2023).
20. K. A Al Soufy, N. H Al-ashwal, M. A Swillam, F. S Al-Kamali, C. D'Amours, E. M Marish, A. N Alnajjar, “”Design of 60 GHz millimeter-wave SIW antenna for 5G WLAN/WPAN applications,” IET Communications, 2023.
21. A. A. Ali Ebrahim, M. A Swillam, A. Belafhal, “Atmospheric turbulent effects on the propagation properties of a general model vortex higher-order Cosh-Gaussian beam,” Optical and Quantum Electronics volume 55, Article number: 316 (2023).
22. N. A Salama, M.A Swillam, M. Hameed, Y Badr, S. M Alexeree, S. SA Obayya, “Ultra high resolution point spread function based on photonic crystal lens for 3D biomedical applications," Optical and Quantum Electronics volume 55, Article number: 290 (2023).
23. R. S El Shamy, M. A Swillam and, X Li, “On-chip complex refractive index detection at multiple wavelengths for selective sensing,” Scientific Reports 12 (1), 1-10, 2022.
24. M. Abdelsalam, M.A. Swillam, “Ultra-broadband MIR super absorber using all silicon metasurface of triangular doped nanoprisms,” Scientific Reports **12**, 14802 (2022).
25. Nagi H. Al-Ashwal, Khaled A. Al Soufy, Faisal S. Al-Kamali, Mohamed A. Swillam, “Performance evaluation of wireless compressed-image transmission over discrete Fourier transform-based orthogonal frequency division multiple access system,” J. Eng. 2022,656–664 (2022).
26. A. A. A. Ebrahim, N. A. Yahya, M. A. Swillam, A Belafhal, “Introduction and propagation properties of circular Lorentz-Bessel-Gaussian beams,” Optical and Quantum Electronics, 54,7, 2022.
27. A. A. A. Ebrahim, M. A. Swillam, A Belafhal, “A. Generation and Propagation Analysis of the Superposition of Humbert-Gaussian Beams,” Optical and Quantum Electronics, 54, 519, 2022.
28. M Abdel-Galil, M. A. Swillam, Y Ismail, D Khalil, “High sensitivity refractive index sensing using zone plate metasurfaces with a conical phase profile,” Scientific Reports 12 (1), 1-9, 2022.
29. R. S. El Shamy, M. A. Swillam, X Li, “On-chip complex refractive index detection at multiple wavelengths for selective sensing,” Scientific Reports 12 (1), 1-10,2022.
30. M. Hamza, M. A Othman, M. A. Swillam,” Plasmonic Biosensors: Review,” *Biology*, 11,5, 2022.
31. N. A. A. Yahya, A. A. A. Ebrahim, M. A. Swillam, R. Abdu-Shukor, “Effects of nanosized PbO and MgO, rolling and sintering time on crack and current density of Bi1.6Pb0.4Sr2Ca2Cu3O10/Ag superconductor tapes,” Journal of Superconductivity and Novel Magnetism, 2022.
32. R. N Aljawfi, S. Mohamed, S. Abass, M. J. Alam, A. A Ahmed, M. A. Swillam, “Photon harvesting and light trapping in Pentacene and PTCDI-C13H27 for organic solar cell application,” Optik, 258, 168931, 2022.
33. R. N Aljawfi, M Abu-Samak, S Kumar, A Shahee, MA Swillam, “Explore the charge transfer and dd excitation in perovskite manganite using 2p3d resonant inelastic X-ray scattering,” Journal of Alloys and Compounds 904, 164020, 2022.

34. R. S. El Shamy, A. E. Afifi, M. Badr, M. El-Rayany, M. A. Swillam "Modelling, characterization, and applications of silicon on insulator loop terminated asymmetric Mach Zehnder interferometer," Scientific Report, Nature Group, 12, 1, 2022.
35. R. El Shamy, M. A. Swillam, and Xun Li , "Optimization Silicon Nitride Waveguide Platform for On-Chip Virus Detection," Sensors, 22 (3), 1152, 2022.
36. A. B Ayoub, and M. A Swillam, "Optical Modulator using Ultra-Thin Silicon Waveguide in SOI Hybrid technology," Optical and Quantum electronics, 54 (181), 2022
37. S. M. Sherif, and M. A. Swillam, "Sub-Femtojoule Optical Modulation Based on Hybrid Plasmonic Devices," Optical and Quantum electronics, 54 (3), 1-10 ,2022.
38. H. Mekawey, M. Elsayed, Y. Ismail, M. A. Swillam, "Optical interconnects finally seeing the light in Silicon Photonics," Nanomaterials, 12 (3), 485 , 2022.
39. A. A. A. Ebrahim, F Saad, M. A. Swillam, A Belafhal, "Propagation of the kurtosis parameter of Hollow higher-order Cosh Gaussian beams through paraxial optical ABCD system," Optical and Quantum Electronics 54 (3), 1-12, 2022.
40. R. S. El Shamy, M. A. Swillam, M. M. ElRayany, A. Sultan, and X. Li, "Compact Gas Sensor Using Silicon-on-Insulator Loop-Terminated Mach–Zehnder Interferometer," *Photonics*, vol. 9, no. 1, p. 8, Dec. 2021.
41. M. A. A. Abouelatta, M. A. Othman, M. Desouky, A. M. Mahmoud, and M. A. Swillam, "Concentric tubes silicon-based metamaterial structure for mid-IR broadband absorption," Optics Express, 29 (25), 41447-41456, 2021,
42. H. Mekawey, Y. Ismail, M. A. Swillam, "Extraordinary optical transmission in silicon nanoholes," Scientific Report, Nature Group, 11 (1), 1-13, 2021.
43. R. S. El Shamy, A. Osama, A. Afifi, M. A. Swillam, Compact 100 GHz Femtojoule Silicon-Organic Hybrid Modulator based on Novel Mach-Zehnder Interferometer Design, Journal of Optics, 23 095801 2021.
44. M. Abu-Samak, S. Kumar, R. N. Aljawfi, M. A Swillam, Electronic structure and energy gaps evaluation of perovskite manganite single crystals using XES and XAS spectroscopy, Journal of Electron Spectroscopy and Related Phenomena, 2021.
45. A. H. K Mahmoud, F. M. H. Korany, C. A Tharwat, M. Hussein, M. A. Swillam, S. S. A Obayya, M. F. O. Hameed, Surface roughness effect on characteristics of Si nanowire solar cell, Journal of Photonics for Energy, 2020.
46. R. N. Aljawfi, M Abu-Samak, S. Kumar, M. A Swillam; "Experimental and DFT investigation of electronic structure and ferromagnetic stable state in pristine and Mn: SnO2 NPs," Volume 179,109536, 2020.
47. A. B Ayoub, M. A Swillam, "Accurate and efficient leap-frog beam propagation method for modeling micro and nanophotonic structures, " Applied Optics, Vol. 59, Issue 23, pp. 6881-6887, 2020.
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49. S. M Almenabawy, M. A Swillam, "Broad-band Organic–Silicon Nanowire Hybrid Composites for Solar Energy Applications,", ACS Applied Nano Materials, 3, 8, 7446–7453, 2020.

50. R. Elshamy, D. A. Khalil, and M. A. Swillam, “Mid Infrared Optical Gas Sensor Using Plasmonic Mach-Zehnder Interferometer,” Nature publications, Scientific reports, 10 (1), 1-9, 2020.
51. N. A. Salama, M. Desouky, and M. A. Swillam, “Free space super focusing using All dielectric hyperbolic metamaterial,” Nature publications, Scientific reports, Scientific Reports 10 (1), 1-9, 2020.
52. M. Abdel-Galil, Y. Ismail, M. A. Swillam, “Infrared Subwavelength Focusing Metasurfaces for Harvesting Heat From The Earth’s Back Radiation,” Physica Scripta, 95 (3), 035505, 2020.
53. N. Fouad, M. Badr, M Fedawy, M A. Swillam, “Shallow silicon sub-wavelength grating waveguide for electro-optical modulation,” Optics Communications, Vol. 474, 126098, 2020.
54. A. H. K Mahmoud, F. MH Korany, C. A Tharwat, M. Hussein, M. A Swillam, S. S. A Obayya, M. Farhat O Hameed, “Surface roughness effect on characteristics of Si nanowire solar cell,” Journal of Photonics for Energy, Vol. 10, 4, 045502, 2020.
55. M. Y Elsayed, S. M Sherif, A. S Aljaber, M. A Swillam, “Integrated Lab-on-a-Chip Optical Biosensor Using Ultrathin Silicon Waveguide SOI MMI Device,” Sensors, vol. 20, 17, 4955, 2020.
56. M. Y Abdelatty, and M. A Swillam “Hybrid Plasmonic Electro-Optical Absorption Modulator Based on phase change characteristics of vanadium-dioxide,” J. Nanophotonics, 13 (4), 046014, 2019.
57. S. Abdel Razek, A. B. Ayoub, and M. A. Swillam, “One Step Fabrication of Highly Absorptive and Surface Enhanced Raman Scattering (SERS) Silver Nano-trees on Silicon Substrate,” Nature publications, Scientific reports, 9 (1), 1-8, 2019.
58. M. Badr, M. Elgarf, M. A. Swillam, "Silicon ring resonator electro-optical modulator utilizing epsilon-near-zero characteristics of indium tin oxide" Physica Scripta, 94, 125507, 2019.
59. S. M. Sherif, M. Elsayed, LA Shahada, and M. A. Swillam, “Vertical Silicon Nanowires based Racetrack Resonator Optical Sensor,” Applied Physics A 125 (11), 769, 2019.
60. S. Shafaay, and M. A. Swillam, “Integrated slotted ring resonator at mid-infrared for on-chip sensing applications,” Journal of Nanophotonics, 13 (3), 036016, 2019.
61. M Abdelsalam, A. M. Mahmoud, and M. A. Swillam, “Polarization independent dielectric metasurface for infrared beam steering applications,” Scientific reports 9 (1), 10824, 2019.
62. R. Elshamy, M. A. Swillam, and D. A. Khalil, “Mid Infrared Integrated MZI Gas Sensor Using Suspended Silicon Waveguide,” IEEE/OSA J. Lightwave technology, 37, 17, 4394-4400, 2019.
63. S. M. Sherif, M. Elsayed, LA Shahada, and M. A. Swillam, “Sub-Femtojoule Hybrid Plasmonic Optical Modulator,” IEEE Photonics 11, 4,1-12, 2019.
64. M. Abdel-Galil, Y. Ismail, M. A. Swillam, “Subwavelength focusing in the infrared range using different metasurfaces,” Physica Scripta, 94 (11), 115511, 2019.
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66. S. Magdi, F. El-Diwany, and M. A. Swillam, "Broadband MIR harvester using silicon nanostructures," Nature publications, Scientific reports,**9**, 5829 (2019).
67. M. A. Swillam, A. O. Zaki, K. Kirah, L.A. Shahada, "On Chip Optical Modulator using Epsilon-Near-Zero Hybrid Plasmonic Platform," Nature publications, Scientific reports 9,1, 6669, 2019.
68. M Desouky, MA Swillam, A Kasry, "Tunable mid IR absorption in single-layer, nanomeshed graphene," Journal of Physics: Conference Series 1253 (1), 012023, 2019
69. M. Badr, M. Y. Abdelatty, M. A. Swillam, "Ultra-fast Silicon Electro-optic Modulator based on ITO-integrated Directional Coupler," Physica Scripta, 94, 6,065502, 2019.
70. M. Y. Azab, M. F. O. Hameed, A. M. Heikal, M. A Swillam, S. S. A. Obayya, "Design considerations of highly efficient D-shaped plasmonic biosensor," Optical and Quantum Electronics 51, 15, 2019
71. M. Desouky, M. R Anisur, M. Alba, R. K S. Raman, M. A Swillam, N. H Voelcker, A. Kasry, "Near-Field Mapping of Localized Plasmon Resonances in Metal-Free, Nanomembrane Graphene for Mid-Infrared Sensing Applications," ACS applied nanomaterial, 1 (11), pp 6454-6462, 2018.
72. S. Magdi, J. El-Rifai, and M. A. Swillam, "Lithography-Free Fabrication of Crystalline Silicon Nanowires Using Amorphous Silicon Substrate for Wide-Angle Energy Absorption Applications," ACS applied nanomaterial, **2018**, *1* (6), pp 2990–2996, 2018.
73. M. Y Abdelatty, M. M Badr, and M. A Swillam, "Compact Silicon Electro-Optical Modulator Using Hybrid ITO Tri-Coupled Waveguides," Journal of Lightwave Technology 36 (18), 4198-4204,2018.
74. S. Magdi, J. El-Rifai, and M. A. Swillam, "One step fabrication of Silicon nanocones with wide-angle enhanced light absorption," Nature publications, Scientific reports 8, 4001, 2018.
75. M. Y. Abdelatty, M. M. Badr, and M. A. Swillam, "High-speed hybrid plasmonic electro-optical absorption modulator exploiting epsilon-near-zero effect in indium-tin-oxide," Journal of Nanophotonics 12 (3), 036011, 2018.
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77. A. B Ayoub, Q Gan, and M. A, Swillam, "Silicon Plasmonic Integrated Interferometer Sensor for Lab on chip Applications," Optics Communications, 319-325, 15 November 2018.
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79. A. B Ayoub, M. A Swillam, "Silicon Plasmonics On-Chip Mid-IR Gas Sensor," IEEE Photonics Technology Letters 30 (10) , May15, 2018.
80. D. C. Zografopoulos, G Sinatkas, E. Lotfi, L.A. Shahada, MA Swillam, EE Kriezis, R Beccherelli, "Amplitude modulation in infrared metamaterial absorbers based on electro-optically tunable conducting oxides," Applied Physics A 124 (2), 105, 2018.

81. M. Desouky, A. M. Mahmoud, M.A. Swillam, “Tunable Mid IR focusing in InAs based semiconductor Hyperbolic Metamaterial,” Scientific Reports, Nature publications, Scientific Reports 7, Article number: 15312, 2017.
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85. S. Magdi, M. A. Swillam, “Investigating several ZrN plasmonic nanostructures and their effect on the absorption of organic solar cells,” Journal of Physics D: Applied Physics, 50, 2017, 385501.
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95. M.Y Abdelatty, AO Zaki, MA Swillam, "Hybrid silicon plasmonic organic directional coupler-based modulator," Applied Physics A, vol. 123, no. 1, p. 11, 2017.
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98. M. A. Ayad, and M. A. Swillam, “Mid-Infrared Plasmonic Power Splitters,” IEEE Photonics Technology Letters, 28 (21), 2431-2434, 2016.
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100. A. O. Zaki, K. Kirah, M. A. Swillam, “Integrated optical sensor using hybrid plasmonics for lab on chip applications,” J. Optics, vol. 18,no. 2016.
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Invited Papers:

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156. M. A. Swillam, "On-Chip Plasmonic Modulator," *The 3rd International Conference on Theoretical and Condensed Matter Physics 2017, New York, USA, 2017.* ***Keynote talk***
157. M. A. Swillam, "Novel platform for Optical Modulation Using Silicon Photonics," *The 4th Advanced Electromagnetics Symposium,* Malaga, Spain 2016
158. M. A. Swillam, "Optical and Electrical Control of NonHermition Silicon Nanophotonics, " *the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics, META'16,* Malaga, Spain, 2016.
159. M. A. Swillam, "Mid infrared Applications of Silicon Thermoplasmonics," Photonics North 2016, Quebec City, Canada.
160. S. M. Sherif, L. A. Shahada, M. A. Swillam, "Silicon Nanowires Organic Hybrid Modulator Based On Directional Coupler," *the 7th International*

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171. M. Ali, A. M. Ghanim, M. A. Othman, and M. A. Swillam, 'Silicon-based, fractal metamaterial structure for IR broadband absorption', in Silicon Photonics XVIII, 2023, vol. 12426, pp. 173–178.
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- M. A. Swillam, "Novel platform for Optical Modulation Using Silicon Photonics," *The 4th Advanced Electromagnetics Symposium,* Malaga, Spain 2016
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- M. A. Swillam, "Mid infrared Applications of Silicon Thermoplasmonics," Photonics North 2016, Quebec City, Canada.
- S. M. Sherif, L. A. Shahada, M. A. Swillam, "Silicon Nanowires Organic Hybrid Modulator Based On Directional Coupler," *the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics, META'16,* Malaga, Spain, 2016.
- D. C. Zografopoulos , M A. Swillam , and Romeo Beccherelli, "Hybrid plasmonic add-drop filter based on novel micro-ring-disk resonators with fJ switching energy," *the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics, META'16,* Malaga, Spain, 2016.

- M. A. Swillam, “Energy Manipulation using Thermoplasmonics” International Conference on Metamaterial, plasmonics and photonic crystals, META 15, NYC, USA, 2015.
- M. A. Swillam, “Manipulation of light at Nanoscale,” Texas A&M Qatar, 2015.
- M. A. Swillam, “Novel Nano optical Material,” Qatar University, 2015
- M. A. Swillam, “Smart Techniques for Modelling Nanophotonic Circuits,” 14th International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD), Mallorca, Spain, 2014.
- M. A. Swillam, “Recent Advances in Silicon Photonics,” University at Buffalo, NY, 2014.
- M. A. Swillam, “*Tunable plasmonics*,” International Conference on Metamaterial, plasmonics and photonic crystals, META 13, Dubai, March 2013.
- M. A. Swillam B. Lua, C. Lin and A. S. Helmy, “Design, fabrication, characterization of Nano-scale plasmonic networks,” Photonics North, Ottawa 2011.
- M. A. Swillam, B. Lua,, C. Lin, and A. S. Helmy, "Feedback effect in plasmonic networks," *International Conference on Advanced Infocomm Technology* 2011, Wuhan, China.
- M. A. Swillam, C. Lin, and A. S. Helmy, "Fabrication and application of silicon-plasmonic networks," *Workshop on Metamaterials and Plasmonics: Novel Materials, Designs, and Applications*, Buffalo, NY.
- M. H. Bakr, and M. A. Swillam, “Advances in adjoint sensitivity analysis,“ Dalhousie University,” 2010.
- M. A. Swillam, “Design and Modelling of Plasmonics and its potential application in Solar cells,” IBM, 2009.
- M. A. Swillam,” Efficient techniques for design optimization of nanophotonics,“ University of Michigan, Ann Arber, 2008.
- M. A. Swillam,” Application of 3D Plasmonic Structures,“ University of Toronto, 2009.

Selected Projects

- M. A. Swillam, "Modeling of three energy level Erbium doped optical fiber amplifier," ECE 756, McMaster University, (April 2005).
- M. A. Swillam, "Comparison of nonlinear optimization software packages for microwave and photonics applications,” 6TE3, McMaster University, (April 2005).

Theses:

- M. A. Swillam,” Sensitivity Analysis and Design Optimization of Photonic Devices,” Ph. D, Elect. and Compt. Engineering Dept., McMaster University.
- M. A. Swillam," Self Imaging in Multimode Interference Device Made on Glass Substrates," Electron. and Comm. Engineering Dept., Ain Shams University.

PROFESSIONAL SKILLS

Software Skills:

- Implemented Numerical Techniques for Photonic devices: FDTD, BPM, TLM, FEM, non linear Schrödinger equation and modal analysis
- Implemented Techniques for Semiconductor devices: time dependent Schrödinger equation, time independent Schrödinger equation, Kronig Penny method, transport equations, Monte Carlo simulation, transmission matrix method, and WKB.
- Implemented Optimization Techniques: interior point method, gradient based optimization algorithms, Trust region, and space mapping.
- System simulators: Simulink & System View.
- Device simulators: Lumerical, RSOFT, Optiwave, MEFiSTo, CST, Maxwell, HFSS,COMSOL Orcad & Pspice .
- PCB Layout: Expedition & Orcad Layout Plus.
- Optimization Tools: IPOPT, KNITRO, LANCELOT, MINOS, LOQO,& SeDuMi
- Process Simulator: Supreme.
- Mathematics packages: Familiar with Mathematica, Python, Matlab.
- Programming: Familiar with Matlab, Java, C, and Assembly.
- Word processors: Microsoft Word, Latex

Hardware Skills:

- Hands on experience on microfluidics fabrication and testing.
- Hands on experience in various nanotechnology fabrication and clean room processes including etching, SEM, thin film deposition, E-beam and optical lithography.
- Fabrication and Characterization of photonic devices.
- Linear and nonlinear loss measurements of optical components.
- Fabrication and characterization of fiber and integrated optical components
- Fiber connectorizing, polishing, and splicing.
- Ultrafast laser spectroscopy using ultra short pulsed laser and pump-probe experiments.
- Fabrication and measurements of microwave and antenna components.

SCHOLARSHIPS & AWARDS

- Listed in the recent Stanford ranking of the top 2% Scientists in the field of photonics and optoelectronics (2020).
- The AUC Excellence in Research and Creative Endeavors Award (2017).
- Early Career Award (2016) from the Applied computational electromagnetic society, ACES and IEEE for using novel methods in designing various nanophotonic society.
- State Award in Advanced Technology 2013.
- Nominated by the SSE to the “SciVal Profiles” as being one of the prominent researchers at AUC.
- Recognized by Stanford who is who in Science and Engineering.
- Misr Elkair (MEK), Best publication award in physical sciences, 2012.

- Ontario Ministry of Research and Innovation Post Doctoral Fellowship (2011).
- Dean's award for graduate student knowledge translation and innovation from McMaster University (2009).
- Ph.D thesis is chosen as the best thesis in the ECE Dept. and nominated by the Dept. and the faculty of Engineering for the general governor gold medal award.
- Postdoctoral fellowship from the Natural Sciences and Engineering Research Council of Canada (NSERC) (2009). "*Ranked* 2nd *over* 257 *applicants nation wide*"
- Research in Motion (RIM) Ontario graduate award (2009).
- Best student paper award from Computational electromagnetics society, for ACES (2009).
- Ontario Graduate Scholarship (OGS) (2008).
- Ontario Graduate Scholarship in Science and Technology (NORTEL OGSST) (2007).
- Best student paper award from the IEEE Ottawa section for Photonics North 2007.
- McMaster University internal Ph. D. scholarship, Electrical and computer engineering Dept (2005- 2007).
- NATO Advanced research program award (2004).
- Ain shams University M.Sc., scholarship, Electrical and computer engineering Dept. (2001-2004)
- Egyptian Government Excellence award (1995- 2000).

RESEARCH EXPERIENCE:

- Supervisor of more than 30 graduate students at AUC, Zewail City, Ain Sahms University, and NILES.
- Co-supervising Master and Ph.D students in the CEM and photonic group at McMaster University.(2 Ph.D, 1 MSc., 1 undergraduate)
- Co-supervising Master and Ph.D students in the photonic group at University of Toronto.(1 Ph.D, and 3 MSc., 2 undergraduates)
- Research Assistant at McMaster University, (Jan.2005 till Dec. 2008).
- Research Assistant at Ain Shams University, (Oct. 2000 to Aug. 2004).

TEACHING EXPERIENCE

September 2011 till Now:

- Professor at the school of science and engineering at the American University. Teaching graduate and undergraduate courses in science and engineering.

September 2010 till April 2011:

- Sessional lecturer at the school of computational engineering and sciences at McMaster University.
  - Foundations of computational finite element method (fall 2010)
- Sessional lecturer at the department of electrical and computer engineering, McMaster University.
  - Computational electromagnetic methods (winter 2010)

January 2005 till December 2008:

- Teaching Assistant at McMaster University, Hamilton, Ontario, Canada.
  - Responsible of tutoring and grading undergraduate students in the following courses:
    Electronic circuits, Signal and systems, introduction of electrical engineering, Electromagnetics I, Electromagnetics II.
- Invigilation presider for undergraduate examination at McMaster University.

WORK EXPERIENCE

- Senior technical Consultant at ASML 2019- 2021.
- Senior technical Consultant at Lightwave Inc. 2021-Now.
- Senior technical Consultant at Biobusiness Inc. 2021-Now.
- Principle Research Engineer, ASML, Wilton, CT, 2018 till 2019.
- Abbydos Cons., Co-founder and Vice president, 2008- 2011.
- Summer intern at Egyptec Inc. for wireless communication application, 1998.
- Part time Hardware engineer at MEDICOM Egypt for computer hardware, 2000-2004.
- Sci-Model for consulting, founder and president, 2014-Now

RESEARCH INTERESTS

- Design, fabrication and characterization of optical devices for sensing applications.
- Design and fabrication of novel solar cell
- Silicon photonics.
- Design and fabrication of optical nanoantenna for biomedical and energy harvesting.
- Design and fabrication devices for optical metrology and alignment sensors.
- Time domain spectroscopy techniques in THz.
- Efficient techniques for microwave imaging.
- Optical coherent control of nanophotonic devices and its application.
- Novel gain assisted metamaterial.
- Signal processing techniques for Electromagnetics.
- Smart optimization methods for microwave and optical components.
- Sensitivity analysis and design optimization of microwave and nanophotonics components.
- Modeling and simulation of optical fiber communication systems.
- Fabrication and characterization of integrated nano components.
- Modeling and simulation of microwave and antenna components.
- CAD tools for modeling active and passive photonic devices.
- CAD tools for modeling nanostructures and quantum semiconductors.

RESEARCH PROPOSALS

I have received and written the following proposals as a main applicant:

- Saline Hydroponics Agriculture Using IoT Distributed Biosensing Network for Climate Change Adaptation, ASRT 2022, **150 K** USD
- On Chip system climate change monitoring , **AUC- 60 K USD.**
- Lab-on-chip Pathogens Biosensor for Crops' Infection Monitoring, CFH international Foundation 2022, **58 K USD**.
- Multiband energy harvesting using Photovoltaics/Thermal harvesting hybrid technology, ASRT 2022, **150 K** USD.
- On Chip gas sensor for pollution applications, ITIDA 2021 **25K USD.**
- Plasmonic Biosensor for Covid 19 detection, **ASRT 2021, 150 K USD**
- Novel Solar cell design and fabrication, ASRT 2018, **350 K USD**
- Mid IR on chip biosensor**, AUC, 2017, 30 K USD.**
- Novel optical sensors for environment and health applications, ASRT 2017, **150 K USD**
- Modelling and Fabrication of on Chip Glucose sensor**, AUC, 2016, 100 K USD.**
- Fabrication of On Chip Thermal Harvester, ASRT, 2016, **150 K USD**
- Novel On chip Modulators, Qatar foundation 2014, **755 K USD**.
- Silicon Photonics, Mentor Graphics,2013, **20K USD.**
- Physical Verifications of Photonics, **ITIDA, 20 K USD**.
- Design of Multifunctional Nanostructured Systems for Efficient Solar Energy-Driven Clean Fuel Production, Qatar foundation 2013, **995 K USD**.
- Solar cell and Nanoantennas, Ontario ministry of research and innovations, April 2011, **120 K CND** for 2 years.
- Photonic Metamaterial and plasmonic applications (October 2008),NSERC, **80K CND** for 2 years.
- Sensitivity analysis of photonic devices, Ontario ministry of research, 2008, **20 K CND** for one year.
- Design optimization of photonic devices, Ontario ministry of research, 2007, **15K CND** for one year.

I have received and written the following proposals as co-applicants

- Photonics Crystal wearable sensor, Science and technological development fund, Egypt **150 K USD**.
- Sensitivity analysis and design optimization of nanophotonic devices for biomedical and energy applications, NSERC Discovery, October 2010, **90 K/year** for 5years.
- Fabrication of photonic devices for solar cell applications, NSERC, October 2010, **40K**/year for 3 years.

PROFESSIONAL ACTIVITIES

- Professional Membership:
  - ***Senior member*** at the Institute of Electrical and Electronics Engineer (**IEEE**) since 2010.
  - ***Senior member*** at the International Society for Optics and Photonics (**SPIE**) since 2017.
  - ***Senior member*** at the Optical Society of America (**OSA**) since 2019.

- **Associate Editor**, J. Advanced electromagnetics.(2013-2018)
- **Associate Editor**, J. Nanophotonics. (2018-Now)
- **Associate Editor,** J Frontiers in Physics, (2019-Now).
- **Associate Editor,** J Frontiers in Photonics, (2022-Now).
- **Topical Editor,** J photonics MDPI, (Sept 2019-Now)
- ***Guest Editor*** in Journal of Optical and Quantum electronics, 2016.
- ***Guest Co Editor***, Applied Physics A, 2015.
- **Editor** in the SPIE News room through "Fact Media"
- ***Guest Editor*** in Journal of Optical and Quantum electronics,2015
- ***Member of the Editorial board*** *of Review of Applied physics Journal.*
- ***Member of the Editorial board of*** *Journal of Photonics and Optoelectronics.*
- ***Member of the Editorial board of*** the Journal of Bio-Inspired Nanotechnology - (BN).
- ***Member of the technical/program committee of*** 3rd International Conference on Theoretical and Condensed Matter Physics, NYC, 2017.
- ***Member of the technical/program committee of*** the International Conference on Metamaterial, Plasmonics and Photonic crystals, (META).
- ***Member of the technical/program committee of*** *the international conference of Numerical simulation of optoelectronic devices (NUSOD).*
- ***Member of the technical/program committee of*** *the international symposium of photonics and optoelectronics (SOPO)***.**
- ***Member of the technical/program committee of*** *the International Conference on Microwave and Photonics* (**ICMAP - 2015**)
- ***Member of the technical/program committee of*** *the international conference of Industry Academia collaboration* (**IAC 2015**).
- Vice president of Optical society of America Egypt Local unit.
- Member of the International society for optical engineering (SPIE).
- Member of Applied computational electromagnetic society (ACES).

- ***Symposium Chair and Organizer***, International conference on Metamaterial, plasmonics and photonic crystals, META 18, Marseille , June 2018.
- ***Session Chair and Organizer***, 2017 International Applied Computational Electromagnetics Society (ACES) Symposium. Italy, March 2017.
- ***Session organizer and Chair****, The 4th Advanced Electromagnetics Symposium,* Malaga, Spain 2016
- ***Session organizer and Chair***, International conference on Metamaterial, plasmonics and photonic crystals, META 16, Malaga, July 2016.
- ***Session organizer and Chair***, International conference on Metamaterial, plasmonics and photonic crystals, META 15, NYC, August 2015.
- ***Session chair*** at Photonics West conference, San Francisco, 2018.
- ***Session chair*** at Photonics West conference, San Francisco, 2019.
- ***Session chair*** at Photonics North 2011 conference, Ottawa.
- ***Session chair*** at international conference of Numerical simulation of optoelectronic devices (NUSOD) Spain 2014.
- ***Session organizer and Chair***, International conference on Metamaterial, plasmonics and photonic crystals, META 13, Dubai, March 2013.

- ***Member of the organization and technical committee*** for the 24th International conference of review of progress in applied electromagnetics 2008, Niagara falls, Canada.
- ***Reviewer:*** for the following journals:
  - Nature photonics
  - ACS Photonics
  - Nanoscale.
  - Applied Physics A
  - Applied Physics Journal
  - Applied Physics Letters
  - IEEE Photonics Journal.
  - Optics Express.
  - Optics Letters.
  - Nano letters.
  - Nature physics
  - ACS nanomaterial
  - Optica
  - Nature Scientific Reports.
  - JOSA, A and B
  - J. Plasmonics
  - Journal of Modern Optics.
  - Applied Optics
  - Optical Engineering.
  - Journal of Lightwave Technology.
  - IEEE Journal of Quantum Electronics.
  - Nature microsystems and nanoengineering.
  - IEEE Photonics Technology Letters.
  - Optics Communications.
  - Transaction of Microwave Theory and Techniques.
  - Journal of ACES.
  - Journal of Electromagnitcs Waves and Applications.
  - Progress of Electromagnetic Research (PIER).
  - International journal of RF and microwave applications.
  - Optical and Quantum electronics

EXTRA CURRICULAR ACTIVITIES

- Advisor of the society of physics students (SPS)
- Advisor and founder of the SPIE, AUC chapter.
- Advisor and founder of the OSA AUC chapter.
- Ambassador to the Undergraduate Research, AUC.
- Vice President, OSA Egypt local unit.
- Vice President, McMaster Graduate Students Association (GSA) (2007-2008).
- Chair, membership developing committee, Institute of Electrical and Electronics Engineering (IEEE), Hamilton section (2006-2007).
- President, Egyptian student association in North America, Hamilton section, (May 2006-Jan. 2009).
- President, Egyptian club, McMaster University, (Sep 2006- Jan. 2009).
- Vice President, Egyptian student association in North America , Hamilton branch, (Sep. 2005-May 2006)
- Vice President, Egyptian club, McMaster University (Sep 2005-Sept. 2006).

LANGUAGE SKILLS

English :	Excellent "written and spoken”.
Arabic	Excellent.

HOBBIES

Reading novels. Playing Soccer, Basketball and Swimming.