Short Bio: Erez Hasman

Erez Hasman is the Schlesinger chaired Professor at the Technion – Israel Institute of Technology, Haifa, Israel and head of the Atomic-Scale Photonics Laboratory. He received the B.Sc. degree in physics in 1981 from Tel Aviv University, the M.Sc. degree in 1985 from the Technion, Haifa, and the Ph.D. in 1992 from Weizmann Institute of Science, Rehovot. Before joining the Technion Erez was a senior project physicist and served as the chief physicist in high-Tech industries; Rafael, Optrotech (Orbotech) and Elop Electrooptics Industries. He was also a Visiting Professor at Stanford University, Stanford, CA. (2011-2012).

Erez initiated and demonstrated the first metasurface, pioneering the field of optical metasurfaces [the first *metallic* metasurface: Opt. Lett. **26**, 1424 (2001) *312 citations*; the first *dielectric* metasurface: Opt. Lett. **27**, 1141 (2002) *514 citations*; the first *orbital angular momentum* metasurface: Opt. Lett. **27** 1875 (2002) *285 citations*; the first *vectorial vortex* metasurface Opt. Lett. **27**, 5 (2002) *470 citations*]. In general, a metasurface can be described as an array of nanoantennas, serving as local phase shifters. Such nanopatterned structures are used for complex light manipulations, paving the route for the generation of multifunctional and quantum metasurfaces, and as a platform to study various physical phenomena.

His research group has made significant contributions in the field of nanophotonics, metasurfaces and radiative heat transfer from nanoscale structures. Among his most significant contributions are the discoveries of the Pancharatnam-Berry phase metasurfaces, (PBM, Geometric phase) utilizing the photonic spin orbit mechanism [Opt. Lett. **26**, 1424 (2001); Opt. Lett. **27**, 1141 (2002)], geometrodynamics of spinning light [**Nature Phot. 2**, 748 (2008) *423 citations*], spin Hall effect in plasmonics [Phys. Rev. Lett. **101**, 043903 (2008) *342 citations*; Phys. Rev. Lett. **101**, 030404 (2008) *273 citations*], photonic Rashba effect [**Science 340**, 724 (2013) *349 citations*] and the first proposing and demonstrating the shared-aperture multifunctional metasurfaces [**Science 352**, 1202 (2016) *278 citations*].

Moreover, Erez presented the first meta-lens [Appl. Phys. Lett. **82**, 328 (2003) *332 citations*], the first dielectric gradient metasurface for the visible spectrum [**Science 345**, 298 (2014) ***1381 citations***] (in collaboration with Prof. Mark Brongersma), and the first observation of optical transition from spin Hall to random Rashba effect induced by subwavelength-scale disordered geometric phase metasurface [**Science 358**, 1411 (2017)]. Erez presented the first experimental observation of quantum entanglement using metasurfaces – the use of a dielectric metasurface to generate entanglement between the spin and orbital angular momentum of photons (in collaboration with Prof. Mordechai Segev) [**Science 361**, 1101 (2018)]. These results show that metamaterials are suitable for the generation and manipulation of entangled photon states, introducing the area of quantum optics metamaterials, [selected by OSA as one of the "hottest" research in 2019, (Optics in 2019), OPN, Optics & Photonics News, December 2019, **30**, 46 (2019), "*Quantum Photonic Metamaterials*"].

Erez reported in Phys. Rev. Lett. (2019) on a topological mechanism for spin-dependent photonic transport – the first observation of photonic topological defects of bound vortex pairs and unbound vortices generated from a two-dimensional array of nanoantennas, The topological phenomena—creation of bound vortex pairs and unbound vortices—indicate the universality of the topological effect for particles of different natures, [Phys. Rev. Lett. **123**, 266101-1 266101-5(2019)]. Recently, Erez's group reported in Nature Nanotechnology the first stochastic photonic spin Hall effect arising from space-variant Berry–Zak phases, which are generated by disordered magneto-optical effects. This spin shift is observed from a spatially bounded lattice of ferromagnetic meta-atoms displaying nanoscale disorders, ["*Probing nanoscale fluctuation of ferromagnetic meta-atoms with a stochastic photonic spin Hall effect*", **Nature Nanotechnology 15**, 450 (2020)]. Erez's approach

may be used for sensing deep-subwavelength disorders by actively breaking the photonic spin symmetry and may enable investigations of fluctuation effects in magnetic nanosystems.

Recently, Erez reported, in Nature Nanotechnology (September 2020), on discovery of the photonic Rashba effect from valley excitons in a WSe2 monolayer, which is incorporated in the Berry-phase defective Photonic crystal. This geometric-phase-induced valley separation establishes a multifunctional interface between valleytronics and photonics via all-silicon nanostructures, which may facilitate viable applications of valleytronics in semiconductor platforms [**Nature Nanotechnology** "*Photonic Rashba effect from quantum emitters mediated by Berry-phase defective photonic crystal*", DOI number: 10.1038/s41565-020-0758-6 (2020)].

He was awarded the Fellow of OSA 2013, “for pioneering contributions in the field of nano-photonics, and specifically for developing a new branch in optics – Spinoptics: the symmetry breaking in nanostructures due to spin-orbit interaction”. Spinoptics has opened a new avenue for controlling light in nanometer-scale optical devices. On the Technion level, he has won 2002 Salomon Simon Mani Award for Excellence in Teaching and the Henry Taub Prize for Research Excellence (2009). He has published over 130 journal papers, book chapters, and hundreds of conference papers. Erez served as an associate editor for Opt. Express (OSA), and was Co-Chair and member of program committees of several international conferences and workshops.

Refereed papers in professional journals

1. "*Measurement of shock initiation threshold of HNAB by flyer plate impact*", E. Hasman, M. Gvishi and Y. Carmel, Propellants, Explosives, Pyrotechnics **11**, 144-149 (1986).

2. "*The initiation threshold sensitivity of HNS as a function of explosive grain size*", E. Hasman, M. Gvishi and A. Solomonovici, Propellants, Explosives, Pyrotechnics **12**, 130-132 (1987).

3. "*Optimal design for holographic focussing elements*", E. Hasman, N. Davidson and A.A. Friesem, Rev. Roum. Phys., tome **33** N 4-6 P. 643-651 (1988).

4. "*Analytic optimization for holographic optical elements*", E. Hasman and A.A. Friesem, J. Opt. Soc. Am. A **6**, 62-72 (1989).

5. "*Holographic focussing elements for far IR radiation*", E. Hasman, N. Davidson, A.A. Friesem, M. Nagler and R. Cohen, Meas. Sci. Technol. **1**, 59-64 (1990).

6. "*Holographic axilens-high resolution and long focal depth*", N. Davidson, A.A. Friesem and E. Hasman, Opt. Lett. **16**, 523-525 (1991).

7. "*Efficient multilevel phase holograms for CO_2 lasers*", E. Hasman, N. Davidson and A.A. Friesem, Opt. Lett. **16**, 423-425 (1991).

8. "*Curved holographic elements for optical coordinate transformations*", N. Davidson, A.A. Friesem, E. Hasman and I. Shariv, Opt. Lett. **16**, 1430-1432 (1991).

9. "*Heterostructure Multilevel Binary Optics*", E. Hasman, N. Davidson and A.A. Friesem, Opt. Lett. **16**, 1460-1462 (1991).

10. "*Multifunctional holographic elements for surface measurements*", E. Hasman, N. Davidson and A.A. Friesem, Opt. Eng. **31**, 363-368 (1992).

11. "*Optical coordinate transformations*", N. Davidson, A.A. Friesem and E. Hasman, Appl. Opt. **31**, 1067-1073 (1992).

12. "*Realization of perfect shuffle and inverse perfect shuffle transforms with holographic elements*", N. Davidson, A.A. Friesem and E. Hasman, Appl. Opt. **31**, 1810-1812 (1992).

13. "*Efficient formation of non-diffracting beams with uniform intensity along the propagation direction*", N. Davidson, A.A. Friesem and E. Hasman, Opt. Commun. **88**, 326-330 (1992).

14. "*Aspheric holographic elements for far IR radiation*", E. Hasman, N. Davidson and A.A. Friesem, Opt. Commun. **89**, 306-315 (1992).

15. "*Diffractive elements for annular laser beam transformation*", N. Davidson, A.A. Friesem and E. Hasman, Appl. Phys. Lett. **61**, 381-383 (1992).

16. "*On the limits of optical interconnects*", N. Davidson, A.A. Friesem and E. Hasman, Appl. Opt. **31**, 5426-5430 (1992).

17. "*Blazed holographic grating for polychromatic and multi-directional incidence light*", N. Davidson, R. Duer, A.A. Friesem and E. Hasman, J. Opt. Soc. Am. **9**, 1196-1199 (1992).

18. "*Computer generated relief gratings as space-variant polarization elements*", N. Davidson, A.A. Friesem and E. Hasman, Opt. Lett. **17**, 1541-1543 (1992).

19. "*Analytic design of hybrid diffractive-refractive achromats*", N. Davidson, A.A. Friesem and E. Hasman, Appl. Opt. **32**, 4770-4774 (1993).

20. "*Reflective and refractive systems for general two dimensional beam transformations*", N. Davidson, A.A. Friesem and E. Hasman, Appl. Opt. **33**, 815-820 (1994).

21. "*Multilevel diffractive elements for generalized wavefront shaping*", Y. Danziger, E. Hasman, A.A. Friesem and A.W. Lohmann, Opt. Eng. **35**, 2556-2565 (1996).

22. "*Diffractive optics: design, realization and applications*", E. Hasman, N. Davidson, Y. Danziger and A.A. Friesem, Fiber & Integrated Optics **16**, 1-25 (1997).

23. "*Discontinuous phase elements for transverse mode selection in laser resonators*", R. Oron, Y. Danziger, N. Davidson, A.A. Friesem and E. Hasman, Appl. Phys. Lett., **74**, 1373-1375 (1999).

24. "T*hree dimensional optical metrology with color-coded extended depth of focus*", E. Hasman, S. Keren, N. Davidson, A.A. Friesem, Opt. Lett., **24**, 439-441 (1999).

25. "*Laser mode discrimination with intra-cavity spiral phase elements*", R. Oron, Y. Danziger, N. Davidson, A.A. Friesem and E. Hasman, Opt. Commun., **169**, 115-121 (1999).

26. "*High-resolution spectrometry for diffuse light using anamorphic concentration*", N. Davidson, L. Khaykovich and E. Hasman, Opt. Lett., **24**, 1835-1837 (1999).

27. "*High power single mode laser operation with intracavity phase elements*", R. Oron, N. Davidson, A.A. Friesem and E. Hasman, OPN, Optics & Photonics News, **10**, 19-20 (1999).

28. "*Anomaly in a high-numerical-aperture diffractive focusing lens*", R. Oron, J.L. Guedalia, N. Davidson, A.A. Friesem and E. Hasman, Opt. Lett., **25**, 439-441 (2000).

29. "*Anamorphic concentration of solar radiation beyond the one-dimensional thermodynamic limit*", N. Davidson, L. Khaykovich and E. Hasman, Appl. Opt. **39**, 3963-3967 (2000).

30. "*Efficient formation of pure helical laser beams*", R. Oron, N. Davidson, A.A. Friesem and E. Hasman, Opt. Commun. **182**, 205-208 (2000).

31. "*Continuous phase elements can improve laser beam quality*", R. Oron, N. Davidson, A.A. Friesem and E. Hasman, Opt. Lett. **25**, 939-941 (2000).

32. "*The formation of laser beams with pure azimuthal or radial polarization*", R. Oron, S. Blit, N. Davidson, A.A. Friesem, Z. Bomzon, and E. Hasman, Appl. Phys. Lett. , **77**, 3322-3324 (2000).

33. "*Color-coded optical profilometry with $>10^6$ resolved depth steps*", E. Hasman, and V. Kleiner, Appl. Opt. **40**, 1609-1619 (2001).

34. "*Computer generated space-variant polarization elements with subwavelength metal stripes*", Z. Bomzon, V. Kleiner, and E. Hasman, Opt. Lett. **26**, 33-35 (2001).

35. "*Achromatic phase retarder by slanted illumination of a dielectric grating with period comparable to the wavelength*", N. Bokor, R. Shechter, N. Davidson, A.A. Friesem, and E. Hasman, Appl. Opt. **40**, 2076-2080 (2001).

36. "*Manipulating the Wigner distribution of high order laser modes*", R. Oron, N. Davidson, A.A. Friesem, E. Hasman, Opt. Commun, **193**, 227-232 (2001).

37. "*Space-variant polarization state manipulation with computer-generated subwavelength metal stripe gratings*", Z. Bomzon, V. Kleiner, E. Hasman, Opt. Commun. **192**, 169-181 (2001).

38. "*Pancharatnam-Berry phase in space-variant polarization state manipulations with subwavelength gratings*", Z. Bomzon, V. Kleiner, E. Hasman, Opt. Lett. **26**, 1424-1426 (2001).

39. "*Formation of radially and azimuthally polarized light using space-variant subwavelength metal stripe gratings*", Z. Bomzon, V. Kleiner, E. Hasman, Appl. Phys. Lett. **79**, 1587-1589 (2001).

40. "*Spatial Fourier-transform polarimetry using space-variant subwavelength metal stripe polarizers*", Z. Bomzon, G. Biener, V. Kleiner, E. Hasman, Opt. Lett. **26**, 1711-1713 (2001).

41. "*Improving the beam quality of high-order laser modes*", A. Ishaaya, R. Oron, N. Davidson, E. Hasman, A.A. Friesem, (Optics in 2001), OPN, Optics & Photonics News, **12**, 55 (2001).

42. "*Space-variant polarization-state manipulation with computer generated subwavelength gratings*", Z. Bomzon, G. Biener, V. Kleiner, E. Hasman, (Optics in 2001), OPN, Optics & Photonics News, **12**, 33 (2001).

43. "*Efficient conversion of a Gaussian beam to a high purity helical beam* ", G. Machavariani, N. Davidson, E. Hasman, S. Blit, A.A. Ishaaya, and A.A. Friesem, Opt. Commun. **209**, 265-271 (2002).

44. "*Laser operation with two orthogonally polarized transverse modes*", R. Oron, L. Shimshi, S. Blit, N. Davidson, A.A. Friesem, and E. Hasman, Appl. Opt. 41, 3634-3637 (2002).

45. "*Radially and azimuthally polarized beams generated by space-variant dielectric subwavelength gratings*", Z. Bomzon, G. Biener, V. Kleiner, E. Hasman, Opt. Lett. **27**, 285-287 (2002).

46. "*Real-time analysis of partially polarized light with space-variant subwavelength dielectric grating*", Z. Bomzon, G. Biener, V. Kleiner, E. Hasman, Opt. Lett. **27**, 188-190 (2002).

47. "Efficient *formation of high quality beam from a pure high order HG mode*", G. Machavariani, N. Davidson, A. Ishaaya, A.A. Friesem, E. Hasman, Opt. Lett. **27**, 1501-1503 (2002).

48. "*Space-variant Pancharatnam-Berry phase optical elements with computer-generated subwavelength gratings*", Z. Bomzon, G. Biener, V. Kleiner, E. Hasman, Opt. Lett. **27**, 1141-1143 (2002).

49. "*Polarization Talbot self-imaging with computer-generated space-variant subwavelength dielectric gratings*", Z. Bomzon, A. Niv, G. Biener, V. Kleiner, E. Hasman, Appl. Opt. **41**, 5218-5222 (2002).

50. "*Non-diffracting periodically space-variant polarization beams with subwavelength gratings*", Z. Bomzon, A. Niv, G. Biener, V. Kleiner, E. Hasman, Appl. Phys. Lett. **80**, 3685-3687 (2002).

51. "*Polarization beam-splitters and optical switches based on space-variant computer-generated subwavelength quasi-periodic structures*", E. Hasman, Z. Bomzon, A. Niv, G. Biener, and V. Kleiner, Opt. Commun. **209**, 45-54 (2002).

52. "*Formation of helical beams by use of Pancharatnam-Berry phase optical elements*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Lett. **27**, 1875-1877 (2002).

53. "*Efficient mode conversion of laser beams*", A.A. Ishaaya, G. Machavariani, N. Davidson, E. Hasman, and A.A. Friesem, (Optics in 2002), OPN, Optics & Photonics News, **13**, 43 (2002).

54. "*Formation of Pancharatnam-Berry phase optical elements with space-variant subwavelength gratings*", E. Hasman, V. Kleiner, G. Biener, and A. Niv, (Optics in 2002), OPN, Optics & Photonics News, **13**, 45 (2002).

55. "*Efficient selection of high-order Laguerre-Gaussian modes in a Q-switched Nd:YAG laser*", A.A. Ishaaya, N. Davidson, G. Machavariani, E. Hasman, and A.A. Friesem, IEEE J. of Quantum Electron. **39**, 74-82 (2003).

56. "*Three-dimensional optical metrology with extended depth-measurement range based on holographic Axilens*", E. Hasman, and V. Kleiner, Opt. Eng. **42**, 132-136 (2003).

57. "*Polarization dependent focusing lens by use of quantized Pancharatnam-Berry phase diffractive optics*", E. Hasman, V. Kleiner, G. Biener, and A. Niv, Appl. Phys. Lett. **82**, 328-330 (2003).

58. "*Formation of linear polarized light with axial symmetry using space-variant subwavelength gratings*", A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Lett. **28**, 510-512 (2003).

59. "*Conversion of a high-order mode beam into a nearly Gaussian beam by use of a single interferometric element*", A.A. Ishaaya, G. Machavariani, N. Davidson, A.A. Friesem, and E. Hasman, Opt. Lett. **28**, 504-506 (2003).

60. "*Near-field Fourier transform polarimetry by use of a quantized space-variant subwavelength grating*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, JOSA A. **20**, 1940-1948 (2003).

61. "*Computer-generated infrared depolarizer by use of space-variant subwavelength dielectric gratings*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Lett. **28**, 1400-14002 (2003).

62. "*Spatial Fourier-transform polarimetry by use of space-variant subwavelength gratings*", E. Hasman, G. Biener ,V. Kleiner, and A. Niv, (Optics in 2003), OPN, Optics & Photonics News, **14**, No. 12, p. 34 (2003).

63. "*Propagation-invariant vectorial Bessel beams obtained by use of quantized Pancharatnam-Berry phase optical elements*", A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Lett. **29**, 238-240 (2004).

64. "*Efficient mode transformations of degenerate Laguerre-Gaussian beams distributions into nearly Gaussian distributions*", G. Machavariani , A.A. Ishaaya, L. Shimshi, N. Davidson, A.A. Friesem, and E. Hasman, Appl. Opt. **43**, 2561-2567 (2004).

65. "*Geometrical phase image encryption obtained with space-variant subwavelength grating*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Lett. 30, 1096-1098 (2005).

66. "*Space-variant polarization manipulation of a thermal emission by a SiO_2 subwavelength grating supporting surface phonon-polariton*s", N. Dahan, A. Niv, G. Biener, V. Kleiner, and E. Hasman, Appl. Phys. Lett. **86**, 191102-1 – 191102-3 (2005).

67. "*Spiral phase elements obtained by use of discrete space-variant subwavelength gratings*", A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Commun. **251**, 306-314 (2005).

68. "*Space-variant polarization manipulation for far-field polarimetry using subwavelength dielectric gratings*", Y. Gorodetski, G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Lett. **30**, 2245-2247 (2005).

69. "*Rotating vectorial vortices produced by space-variant subwavelength gratings*", A. Niv , G. Biener, V. Kleiner, and E. Hasman, Opt. Lett. **30**, 2933-2935 (2005).

70. "*Thermal image encryption obtained with a SiO_2 space-variant subwavelength grating supporting surface phonon-polaritons*", N. Dahan, A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Lett. **30**, 3195-3197 (2005).

71. "*Spatial-polarization state scrambling for image encryption obtained with subwavelength gratings*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, (Optics in 2005), OPN, Optics & Photonics News, **16**, No. 12, p. 41 (2005).

72. "*Space-variant polarization scrambling for image encryption obtained with subwavelength gratings*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Commun. **261**, 5-12 (2006).

73. "*Optical properties of polarization-dependent geometric phase elements with partially polarized light*", Y. Gorodetski, G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Commun. **266**, 365-375 (2006).

74. "*Manipulation of polarization-dependent multivortices with quasi-periodic subwavelength structures*", G. Biener, Y. Gorodetski, A. Niv, V. Kleiner, and E. Hasman, Opt. Lett. **31**, 1594-1596 (2006).

75. "*Manipulation of the Pancharatnam phase in vectorial vortices*", A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Express **14**, 4208-4220 (2006).

76. "*Vectorial vortex mode transformation for a hollow waveguide using Pancharatnam-Berry phase optical elements*", Y. Yirmiyahu, A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Lett. **31**, 3252-3254 (2006).

77. "*Polychromatic vectorial vortex formed by geometric phase elements*", A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Lett. **32**, 847-849 (2007).

78. "*Metallic subwavelength structures for a broadband infrared absorption control*", G. Biener, A. Niv, V. Kleiner, and E. Hasman, Opt. Lett. **32**, 994-996 (2007).

79. "*Enhanced coherency of thermal emission: Beyond the limitation imposed by delocalized surface waves*", N. Dahan, A. Niv, G. Biener, Y. Gorodetski, V. Kleiner, and E. Hasman, Phys. Rev. B **76**, 045427-1 - 045427-5 (2007).

80. "*Excitation of a single hollow waveguide mode using inhomogeneous anisotropic subwavelength structures*", Y. Yirmiyahu, A. Niv, G. Biener, V. Kleiner, and E. Hasman, Opt. Express **15**, 13404-13414 (2007).

81. "*Singular polarimetry: Evolution of polarization singularities in electromagnetic waves propagating through a weakly anisotropic medium*", K. Yu. Bliokh, A. Niv, V. Kleiner, and E. Hasman, Opt. Express **16**, 695-709 (2008).

82. "*Highly coherent thermal emission obtained by plasmonic bandgap structures*", G. Biener, N. Dahan, A. Niv, V. Kleiner, and E. Hasman, Appl. Phys. Lett. **92**, 081913-1 - 081913-3 (2008).

83. "*Extraordinary coherent thermal emission from SiC due to* coupled resonant cavities", N. Dahan, A. Niv, G. Biener, Y. Gorodetski, V. Kleiner, and E. Hasman, J. Heat Trans. SMAE **130**, 112401-1 - 112401-5 (2008).

84. "*Observation of the spin-based plasmonic effect in nanoscale structures*", Y. Gorodetski, A. Niv, V. Kleiner, and E. Hasman, Phys. Rev. Lett. **101**, 043903-1 - 043903-4 (2008).

85. "*Coriolis effect in optics: Unified geometric phase and spin-Hall effect*", K. Bliokh, Y. Gorodetski, V. Kleiner, and E. Hasman, Phys. Rev. Lett. **101**, 030404-1 - 030404-4 (2008).

86. "*Geometrodynamics of spinning light*", K. Bliokh, A. Niv, V. Kleiner, and E. Hasman, Nature Photonics **2**, 748-753 (2008).

87. "*Spinoptics: Spin-based plasmonics in nanostructures*", Y. Gorodetski, K. Bliokh, A. Niv, V. Kleiner, and E. Hasman, (Optics in 2008), OPN, Optics & Photonics News, **19**, No. 12, p. 43 (2008).

88. "*Topological spin-orbit interaction of light in anisotropic inhomogeneous subwavelength structures*", A. Niv, Y. Gorodetski, V. Kleiner, and E. Hasman, Opt. Lett. **33**, 2910-2912 (2008).

89. "*Slow surface phonon polaritons for sensing in the mid-infrared spectrum*", I. Balin, N. Dahan, V. Kleiner, and E. Hasman, Appl. Phys. Lett. **94**, 111112 - 1 111112-3 (2009).

90. "*Observation of optical spin symmetry breaking in nanoapertures*", Y. Gorodetski, N. Shitrit, I. Bretner, V. Kleiner, and E. Hasman, Nano Lett. **9**, 3016-3019 (2009).
*** Selected as Research Highlight in Nature Materials 8, 612 (2009)**.

91. "*Whirling plasmons: Angular momentum selection rule*", Y. Gorodetski, N. Shitrit, I. Bretner, V. Kleiner, and E. Hasman, (Optics in 2009), OPN, Optics & Photonics News, **20**, No. 12, p. 26 (2009).

92. *"Bandgap structure of thermally excited surface phonon polaritons* ", I. Balin, N. Dahan, V. Kleiner, and E. Hasman, Appl. Phys. Lett. **96**, 071911-1 071911-3 (2010).

93. *"New twist on nanoscale motors* ", E. Hasman, Nature Nanotech. (news & views) **5**, 563-564 (2010).

94. "*Geometric Doppler effect: spin-split dispersion of thermal radiation* ", N. Dahan, Y. Gorodetski, K. Frischwasser, V. Kleiner, and E. Hasman, Phys. Rev. Lett. **105**, 136402-1 136402-4 (2010).

95. "*Plasmonic Aharonov-Bohm effect: Optical spin as the magnetic flux parameter*", Y. Gorodetski, S. Nechayev, V. Kleiner, and E. Hasman, Phys. Rev. B **82**, 125433-1 125433- 4 (2010).

96. "*Optical spin-Hall effects in plasmonic chain*", N. Shitrit, I. Bretner, Y. Gorodetski, V. Kleiner, and E. Hasman, Nano lett. **11**, 2038-2042 (2011).

97. "*Rashba-like spin degeneracy breaking in coupled thermal antenna lattices*", K. Frishwasser, I. Yulevich, V. Kleiner and E. Hasman, Opt. Express **19**, 23475-23482 (2011).

98. "*Manipulation of thermal emission by use of micro- and nanoscale structures*", E. Hasman, V. Kleiner, N. Dahan, Y. Gorodetski, K. Frischwasser, I. Balin, (invited review paper) J. Heat Trans. SMAE **134**, 031023-1 031023-7 (2012).

99. "Spin-dependent plasmonics based on interfering topological defects", N. Shitrit, S. Nechayev, V. Kleiner, and E. Hasman, Nano lett. **12**, 1620-1623 (2012).

100. "*Weak measurements of light chirality with a plasmonic slit*", Y. Gorodetski, K.Y. Bliokh, B. Stein, C. Genet, N. Shitrit, V. Kleiner, E. Hasman, and T.W. Ebbesen, Phys. Rev. Lett. **109**, 013901-1 013901-5 (2012) ; Synopsis: Weak measurement of polarization by slit (in PRL website).

101. "*Spin-optical metamaterial route to spin-controlled photonics*", N. Shitrit, I. Yulevich, E. Maguid, D. Ozeri, D. Veksler, V. Kleiner and E. Hasman, **Science 340**, 724-726 (2013). (selected as the highlight research)

102. "*Rashba-type plasmonic metasurface*", N. Shitrit, S. Maayani, D. Veksler, V. Kleiner, and E. Hasman, Opt. Lett. **38**, 4358-4361 (2013).

103. "*Spin-controlled plasmonics via optical Rashba effect*", N. Shitrit, I. Yulevich, V. Kleiner, and E. Hasman, Appl. Phys. Lett. **103**, 211114-1 -211114-4 (2013).

104. "*Spinoptical metamaterials: A novel class of metasurfaces*", N. Shitrit, I. Yulevich, E. Maguid, D. Ozeri, D. Veksler, V. Kleiner and E. Hasman, (Optics in 2013), OPN, Optics & Photonics News, December 2013, p. 53 (2013).

105. "*Dielectric gradient metasurface optical elements*", D. Lin, P. Fan, E. Hasman, M. Brongersma, **Science 345**, 298-302 (2014).

106. *"Omnidirectional near-unity absorption in an ultrathin planar semiconductor layer on a metal substrate"*, J. Park, J-H. Kang, A. Vasudev, D. Schoen, H. Kim, E. Hasman, M. Brongersma, ACS Photonics, **1**, 812-821 (2014).

107. "An ab-initio coupled mode theory for *near field radiative thermal transfer* ", H. Chalabi, E. Hasman and M. Brongersma, Opt. Express, **22**, 30032-30046 (2014).

108. "*Near-field radiative thermal transfer between a nanostructured periodic material and a planar substrate*", H. Chalabi, E. Hasman and M. Brongersma, Phys. Rev. B **91**, 014302-1 014302-9 (2015).

109. "*Multiple wavefront shaping by metasurface based on mixed randon antenna groups*", D.Veksler, E. Maguid, N. Shitrit, D. Ozeri, V. Kleiner, and E. Hasman, ACS Photonics **2**, 661-667 (2015).

110. "*Effect of shape in near-field thermal transfer for periodic structures*", H. Chalabi, E. Hasman and M. Brongersma, Phys. Rev. B **91**, 174304-1 174304-9 (2015).

111. *"Tuning optical absorption in an ultrathin lossy film by use of metallic metamaterial mirror"*, J. Park, J-H., Kang, S. J. Kim, E. hasman, M. Brongersma, IEEE Photonics Techonology Letters **27**, 1617-1620 (2015).

112. "*Optical mode control by geometric phase in quasicrystal metasurface*", I. Yulevich, E. Maguid, N. Shitrit, D. Veksler, V. Kleiner and E. Hasman, Phys. Rev. Lett. **115**, 205501-5 (2015); *selected as PRL editors' suggestion*.

113. "*Spin-controlled optical metasurfaces*", V. Kleiner and E. Hasman, Asian Journal of Physics (AJP) Vol. **24**, No. 12 (2015); *a special issue on "Optics and Photonics for Information Processing" in honor of Professor Joseph Shamir.*

114. "*Photonic spin-controlled multifunctional shared-aperture antenna array* ", E. Maguid, I. Yulevich, D. Veksler, V. Kleiner, M. Brongersma and E. Hasman, **Science 352** 1202-1205 (2016). (See perspective on the paper *"Photonic multitasking enabled with geometric phase"* N. M. Litchinitser, **Science 352** 1177-1178 (2016)). (see also: *"Shared-aperture geometric phase metasurface"* SPIE Newsroom September 2016).

115. "*Multitasking geometric phase metasurfaces* ", E. Maguid, I. Yulevich, D. Veksler, V. Kleiner, M. Brongersma and E. Hasman, (Optics in 2016), OPN, Optics & Photonics News, December 2016, p. 55 (2016).

116. "*Photonic multitasking interleaved Si nanoantenna phased array*", D. Lin, A.L. Holsteen, E. Maguid, G. Wetzstein, P.G. Kik, E. Hasman, M.L Brongersma, Nano Lett. **16**, 7671-7676 (2016).

117. *"Multifunctional Interleaved Geometric Phase Dielectric Metasurfaces,"*

E. Maguid, I. Yulevich, M. Yannai,V. Kleiner, M. L. Brongersma and E. Hasman, Light: Science & Applications - Nature 2017 **6**, e17027; doi:10.1038/lsa.2017.27, (2017).

118. *"Disorder-induced optical transition from spin Hall to random Rashba effect"*, Elhanan Maguid, Michael Yannai, Arkady Faerman, Igor Yulevich, Vladimir Kleiner and Erez Hasman, **Science 358**, 1411-1415 (2017).

119. *"Spin-controlled twisted laser beams: intra-cavity multi-tasking geometric phase metasurfaces"*, R. Chriki, E. Maguid, C. Tradonsky, V. Kleiner, A.A. Friesem, N. Davidson and Erez Hasman, Opt. Express **26**, 905-916 (2018).

120. *"Topologically controlled intracavity laser modes based on Pancharatnam-Berry phase"*, E. Maguid, R. Chriki, M. Yannai, V. Kleiner, E. Hasman, A.A. Friesem and N. Davidson, ACS Photonics **5**, 1817-1821 (2018).

121. *"Polarization-independent metasurface lens employing the Pancharatnam-Berry phase*, Dianmin Lin, Aaron L. Holsteen, Elhanan Maguid, Pengyu Fan, Pieter G. Kik, Erez Hasman and Mark Brongersma, Optics Express **26**, 24835-24842 (2018).

122. *"Quantum entanglement of the spin and orbital angular momentum of photons using metamaterials"*, Tomer Stav, Arkady Faerman, Elhanan Maguid, Dikla Oren, Vladimir Kleiner, Erez Hasman* and Mordechai Segev*, **Science 361**, 1101-1104 (2018). (Corresponding authors)

123. *"Spectrally interleaved topologies using geometric phase metasurfaces"*, Michael Yannai, Elhanan Maguid, Arkady Faerman, Qitong Li, Jung-Hwan Song, Vladimir Kleiner, Mark L. Brongersma and Erez Hasman, Opt. Express **26**, 31031- 31038 (2018).

124. *"Order and Disorder Embedded in a Spectrally Interleaved Metasurface"*, Michael Yannai, Elhanan Maguid, Arkady Faerman, Qitong Li, Jung-Hwan Song, Vladimir Kleiner, Mark L. Brongersma and Erez Hasman, ACS Photonics **5**, 4764-4768 (2018).

125. "*Photonic topological spin Hall effect mediated by vortex pairs*", Bo Wang, Elhanan Maguid, Kexiu Rong, Michael Yannai, Vladimir Kleiner and Erez Hasman, Phys. Rev. Lett. **123**, 266101-1 266101-5(2019).

126. "*Quantum Photonic Metamaterials*", Elhanan Maguid, Tomer Stav, Arkady, Faerman, Dikla Oren-Caspi, Vladimir Kleiner, Mordechai Segev and Erez

Hasman (Optics in 2019), OPN, Optics & Photonics News, December 2019, **30**, 46 (2019).

127. "*Probing nanoscale fluctuation of ferromagnetic meta-atoms with a stochastic photonic spin Hall effect*", Bo Wang, Kexiu Rong, Elhanan Maguid, Vladimir Kleiner and Erez Hasman, **Nature Nanotechnology 15**, 450-456 (2020).

128. "*Photonic Rashba effect from quantum emitters mediated by Berry-phase defective photonic crystal*", Kexiu Rong, Bo Wang, Avi Reuven, Elhanan Maguid, Bar Cohn, Vladimir Kleiner, Shaul Katznelson, Elad Koren and Erez Hasman, **Nature Nanotechnology** DOI number: 10.1038/s41565-020-0758-6. (2020).

Chapters in Books

1. "*Holographic focussing elements for far IR radiation*", E. Hasman, N. Davidson, A.A. Friesem, M. Nagler and R. Cohen, selected paper for Engineering Optics, IOP Publishing Ltd., Bristol, England, 249-254 May 1990.

2. "*Transverse mode shaping and selection in laser resonators*", R. Oron, N. Davidson, A.A. Friesem, E. Hasman, *Progress in Optics*, **42** , p. 325-386, Ed. Prof. Emil Wolf, 2001.

3. "*Space-variant polarization manipulation*", E. Hasman, G. Biener, A. Niv and V. Kleiner, *Progress in Optics*, Prof. Emil Wolf, ed, (Elsevier Amsterdam, 2005), Vol. **47** pages 215-289.

4. "Spinoptics in plasmonics", E. Hasman and V. Kleiner, Chappter 13 in a book "Plasmonics: Theory and applications" (eds. T. V. Shahbazyan and M. I. Stockman), Springer Book Series “Challenges and Advances in Computational Chemistry and Physics 15” 2013.