

Research Area A ,Nano-Photonics^c

Project A1 ‘Photonic Crystals’

A1.1 ‘Theory of Photonic Crystal Structures and Concepts for Photonic-Crystal Based Devices’ (K. Busch)

- [A1.1:1] * ‡ K. Forberich, A. Gombert, S. Pereira, J. Crewett, U. Lemmer, M. Diem, and K. Busch, *Lasing mechanisms in organic photonic crystal lasers with two-dimensional distributed feedback*, *J. Appl. Phys.* **100**, 023110 (2006)
- [A1.1:2] * ‡ K. Forberich, M. Diem, J. Crewett, U. Lemmer, A. Gombert, and K. Busch, *Lasing action in two-dimensional photonic crystal lasers with hexagonal symmetry*, *Appl. Phys. B* **82**, 539 (2006)
- [A1.1:3] ‡ S.F. Mingaleev, A. Miroshnichenko, Y. Kivshar, and K. Busch, All optical switching, bistability, and slow light transmission in photonic crystal waveguide resonator structures, *Phys. Rev. E* **74**, 046603 (2006)
- [A1.1:4] * D.C. Meisel, M. Diem, M. Deubel, F. Perez-Willard, S. Linden, D. Gerthsen, K. Busch, and M. Wegener, *Shrinkage precompensation of holographic three-dimensional photonic-crystal templates*, *Adv. Mater.* **18**, 2964 (2006)
- [A1.1:5] * K. Busch, G. von Freymann, S. Linden, S. F. Mingaleev, L. Tkeshelashvili, and M. Wegener, *Periodic nanostructures for photonics*, *Phys. Rep.* **444**, 101 (2007)
- [A1.1:6] ‡ M. Florescu, K. Busch, and J. Dowling, *Thermal Radiation in Photonic Crystals*. *Phys. Rev. B* **75**, 201101(R) (2007)
- [A1.1:7] * D. Hermann, M. Diem, S.F. Mingaleev, A. Garcia-Martin, P. Wölfle, and K. Busch, *Photonic Crystals with Anomalous Dispersion: Unconventional Propagating Modes in the Photonic Band Gap*, *Phys. Rev. B* **77**, 035112 (2008)
- [A1.1:8] D. Hermann, M. Schillinger, S.F. Mingaleev, and K. Busch, *Wannier-function based scattering-Matrix-Formalism for Photonic Crystal Circuitry*, *J. Opt. Soc. Am. B* **25**, 202 (2008)
- [A1.1:9] * C.E. Kriegler, M.S. Rill, M. Thiel, E. Müller, S. Essig, A. Fröhlich, G. von Freymann, S. Linden, D. Gerthsen, H. Hahn, K. Busch, and M. Wegener, *Transition between corrugated metal films and split-ring-resonator arrays*, *Appl. Phys. B* **96**, 749 (2009)
- [A1.1:10] ‡ M. Florescu and K. Busch, *Properties of Thermal Emission in Photonic Crystals*, *J. Opt. A* **11**, 114005 (2009)
- [A1.1:11] ‡ C. Schuler, C. Wolff, K. Busch, and M. Florescu, *Thermal Emission from Finite Photonic Crystals*, *Appl. Phys. Lett.* **95**, 241103 (2009)
- [A1.1:12] * G. von Freymann, A. Ledermann, M. Thiel, I. Staude, S. Essig, K. Busch, and M. Wegener, *Three-Dimensional Nanostructures for Photonics*, *Adv. Func. Mater.* **20**, 1038 (2010)
- [A1.1:13] * I. Staude, M. Thiel, S. Essig, C. Wolff, K. Busch, G. von Freymann, and M. Wegener, *Fabrication and characterization of silicon woodpile photonic crystals with a complete bandgap at telecom wavelengths*, *Opt. Lett.* **35**, 1094 (2010)
- [A1.1:14] ‡ S.G. Romanov, U. Peschel, W. Khunzin, S. Essig, and K. Busch, *Polarization anisotropy and cross-polarized transmission in thin film opal-based photonic crystals*, *Proc. SPIE* **7713**, 771304 (2010)
- [A1.1:15] ‡ P.W. Nolte, D. Pergande, S.L. Schweizer, M. Geuss, R. Salzer, B.T. Makowski, M. Steinhart, P. Mack, D. Hermann, K. Busch, C. Weder, and R.B. Wehrspohn, *Photonic crystal devices with multiple dyes by consecutive local infiltration of single pores*, *Adv. Mater.* **22**, 4731 (2010)

- [A1.1:16] ‡ S.G. Romanov, U. Peschel, M. Bardosova, S. Essig, and K. Busch, *Suppression of the critical angle of diffraction in thin-film opal-like photonic crystals*, Phys. Rev. B **82**, 115403 (2010)
- [A1.1:17] ‡ C.J. Schuler, C. Wolff, K. Busch, and M. Florescu, *Thermal emission from finite photonic crystals*, Proc. SPIE **7756**, 77560B (2010)
- [A1.1:18] S. Essig and K. Busch, *Generation of Adaptive Coordinates and their Use in the Fourier Modal Method*, Opt. Express **18**, 23258 (2010)
- [A1.1:19] * L.-H. Shao, M. Ruther, S. Linden, S. Essig, K. Busch, J. Weissmüller, and M. Wegener, *Electrochemical Modulation of Photonic Metamaterials*, Adv. Mater. **22**, 5173 (2010)
- [A1.1:20] * I. Staude, G. von Freymann, S. Essig, K. Busch, and M. Wegener, *Waveguides in three-dimensional photonic-band-gap materials by direct laser writing and silicon double inversion*, Opt. Lett. **36**, 67 (2011)
- [A1.1:21] C. Blum, C. Wolff, and K. Busch, *Photonic-Crystal Time-Domain Simulations using Wannier Functions*, Opt. Lett. **36**, 307 (2011)
- [A1.1:22] K. Busch, C. Blum, A.M. Graham, D. Hermann, M. Köhl, P. Mack, and C. Wolff, *The Photonic Wannier Function Approach to Photonic Crystal Simulations: Status and Perspectives*, J. Mod. Opt. **58**, 365 (2011)

A1.2 ‘Light-Matter Interaction in Nano-Photonic Systems’ (K. Busch)

- [A1.2:1] ‡ A. Hache, L. Tkeshelashvili, M. Diem, and K. Busch, *Testing random numbers with periodic structures*, *Europhys. Lett.* **73**, 225 (2006)
- [A1.2:2] J. Niegemann, L. Tkeshelashvili, S. Pereira, and K. Busch, *Nonlinear wave interaction in photonic band gap materials*, *Photonics Nanostruct.* **4**, 75 (2006)
- [A1.2:3] ‡ K. Busch, G. Schneider, L. Tkeshelashvili, and H. Uecker, *Justification of the Nonlinear Schrödinger Equation in Spatially Periodic Media*, *Z. Angew. Math. Phys.* **57**, 905 (2006)
- [A1.2:4] ‡ A. Hache, M. Malik, M. Diem, L. Tkeshelashvili, and K. Busch, *Measuring randomness with periodic media*, *Photonics Nanostruct.* **5**, 29 (2007)
- [A1.2:5] J. Niegemann, L. Tkeshelashvili, and K. Busch, *Higher-order time-domain simulations of Maxwell’s equations using Krylov-subspace methods*, *J. Comput. Theor. Nanosci.* **4**, 627 (2007)
- [A1.2:6] K. Busch, J. Niegemann, M. Pototschnig, and L. Tkeshelashvili, *A Krylov subspace based Solver for the linear and nonlinear Maxwell Equations*, *phys. stat. sol. (b)* **244**, 3479 (2007)
- [A1.2:7] M. König, J. Niegemann, M. Pototschnig, L. Tkeshelashvili, and K. Busch, *Efficient modelling of nonlinear wave propagation and radiation dynamics in nano-photonic systems*, *Proc. SPIE* **6775**, 67750D (2007)
- [A1.2:8] S. Essig, J. Niegemann, L. Tkeshelashvili, and K. Busch, *Solitary Wave Formation in One-dimensional Photonic Crystals*, *phys. stat. sol. (a)* **204**, 3591 (2007)
- [A1.2:9] ‡ J. Hagmann, L. Tkeshelashvili, K. Busch, and G. Schneider, *Far-off-resonant Wave Interaction in One-dimensional Photonic Crystals with Quadratic Nonlinearity*, *Phys. Rev. A* **77**, 023809 (2008)
- [A1.2:10] J. Niegemann, L. Tkeshelashvili, and K. Busch, *Chaotic Scattering of Solitons on Point Defects in Fiber Bragg Gratings*, *Opt. Express* **16**, 10170 (2008)
- [A1.2:11] * M. Husnik, M.W. Klein, N. Feth, M. König, J. Niegemann, K. Busch, S. Linden, and M. Wegener, *Absolute Extinction Cross Section of Individual Magnetic Split-Ring Resonators*, *Nature Photonics* **2**, 614 (2008)
- [A1.2:12] J. Niegemann, M. König, K. Stannigel, and K. Busch, *Higher-Order Time-Domain Methods for the Analysis of Nano-Photonic Systems*, *Photonics Nanostruct.* **7**, 2 (2009)
- [A1.2:13] K. Stannigel, M. König, J. Niegemann, and K. Busch, *Analysis of metallic nanostructures via a Discontinuous Galerkin Time-Domain approach*, *Proc. SPIE* **7353**, 73530C (2009)
- [A1.2:14] M. Pototschnig, J. Niegemann, L. Tkeshelashvili, and K. Busch, *Time-Domain Simulations of the Nonlinear Maxwell Equations Using Operator-Exponential Methods*, *IEEE Trans. Ant. Propagat.* **57**, 475 (2009)
- [A1.2:15] * F.B.P. Niesler, N. Feth, S. Linden, J. Niegemann, J. Gieseler, K. Busch, and M. Wegener, *Second-harmonic generation from split-ring resonators on a GaAs substrate*, *Opt. Lett.* **34**, 1997 (2009)
- [A1.2:16] * P. Longo, P. Schmitteckert, and K. Busch, *Dynamics of photon transport through quantum impurities in dispersion-engineered one-dimensional systems*, *J. Opt. A* **11**, 114009 (2009)
- [A1.2:17] * P. Longo, P. Schmitteckert, and K. Busch, *Few-photon transport in low-dimensional systems: Interaction-induced radiation trapping*, *Phys. Rev. Lett.* **104**, 023602 (2010)

- [A1.2:18] * N. Feth, M. König, M. Husnik, K. Stannigel, J. Niegemann, K. Busch, M. Wegener, and S. Linden, *Electromagnetic interaction of split-ring resonators: The role of separation and relative orientation*, Opt. Express **18**, 6545 (2010)
- [A1.2:19] M. König, K. Busch, and J. Niegemann, *The Discontinuous Galerkin Time-Domain Method for Maxwell's Equations with Anisotropic Materials*, Photonics Nanostruct. **8**, 303 (2010)
- [A1.2:20] J. Niegemann, M. König, and K. Busch, *Simulations of nano-antennas with the Discontinuous Galerkin Time-Domain method*, Proc. SPIE **7713**, 77130Z (2010)
- [A1.2:21] M. König, C. Prohm, K. Busch, and J. Niegemann, *Stretched-coordinate PMLs for Maxwell's equations in the discontinuous Galerkin time-domain method*, Opt. Express **19**, 4618 (2011)
- [A1.2:22] * P. Longo, P. Schmitteckert, and K. Busch, *Few-photon transport in low-dimensional systems*, Phys. Rev. A **83**, 063828 (2011)
- [A1.2:23] ‡ C. Matyssek, J. Niegemann, W. Hergert, and K. Busch, *Computing electron energy loss spectra with the Discontinuous Galerkin Time-Domain method*, Photonics Nanostruct. **9**, 367 (2011)
- [A1.2:24] K. Busch, M. König, and J. Niegemann, *Discontinuous Galerkin methods in nanophotonics*, Laser Photonics Rev. **5**, 773 (2011)
- [A1.2:25] * ‡ F. von Cube, S. Irsen, J. Niegemann, C. Matyssek, W. Hergert, K. Busch, and S. Linden, *Spatio-spectral characterization of photonic meta-atoms with electron energy-loss spectroscopy*, Opt. Mater. Expr. **1**, 1009 (2011)
- [A1.2:26] * ‡ N. Meinzer, M. König, M. Ruther, S. Linden, G. Khitrova, H.M. Gibbs, K. Busch, and M. Wegener, *Distance-dependence of the coupling between split-ring-resonators and single-quantum-well gain*, Appl. Phys. Lett. **99**, 111104 (2011)

A1.4 ,Three-Dimensional Photonic Crystals' (M. Wegener, G. von Freymann)

- [A1.4:1] *‡ N. Tétreault, G. von Freymann, M. Deubel, M. Hermatschweiler, F. Pérez-Willard, S. John, M. Wegener, and G.A. Ozin, *New Route towards Three-Dimensional Photonic Bandgap Materials: Silicon Double Inversion of Polymeric Templates*, *Adv. Mater.* **18**, 457 (2006)
- [A1.4:2] *‡ S. Wong, M. Deubel, F. Pérez-Willard, S. John, G.A. Ozin, M. Wegener, and G. von Freymann, *Direct laser writing of three-dimensional Photonic Crystals with a complete photonic bandgap in chalcogenide glasses*, *Adv. Mater.* **18**, 265 (2006)
- [A1.4:3] ‡ M. Deubel, M. Wegener, G. von Freymann, S. Linden, and S. John, *3D-2D-3D photonic crystal heterostructures fabricated by direct laser writing*, *Opt. Lett.* **31**, 805 (2006)
- [A1.4:4] * D.C. Meisel, M. Diem, M. Deubel, F. Pérez-Willard, S. Linden, D. Gerthsen, K. Busch, and M. Wegener, *Shrinkage Pre-Compensation of Holographic Three-dimensional Photonic Crystals*, *Adv. Mater.* **18**, 2964 (2006)
- [A1.4:5] ‡ A. Ledermann, L. Cademartiri, M. Hermatschweiler, C. Toninelli, G.A. Ozin, D.S. Wiersma, M. Wegener, and G. von Freymann, *Three-dimensional silicon inverse photonic quasicrystals for infrared wavelengths*, *Nature Mater.* **5**, 942 (2006)
- [A1.4:6] C. Becker, M. Wegener, S. Wong, and G. von Freymann, *Phase-matched non-degenerate four-wave mixing in one-dimensional photonic crystals*, *Appl. Phys. Lett.* **89**, 131122 (2006)
- [A1.4:7] * K. Busch, G. von Freymann, S. Linden, S. Mingaleev, L. Tkeshelashvili, and M. Wegener, *Periodic nanostructures for photonics*, *Phys. Rep.* **444**, 101 (2007)
- [A1.4:8] M. Thiel, M. Decker, M. Deubel, M. Wegener, S. Linden, and G. von Freymann, *Polarization stop bands in chiral polymeric three-dimensional photonic crystals*, *Adv. Mater.* **19**, 207 (2007)
- [A1.4:9] ‡ M. Hermatschweiler, A. Ledermann, M. Wegener, G.A. Ozin, and G. von Freymann, *Fabrication of infrared silicon inverse woodpile photonic crystals*, *Adv. Funct. Mater.* **17**, 2273 (2007)
- [A1.4:10] *‡ S.H. Wong, M. Thiel, P. Brodersen, D. Fenske, G.A. Ozin, M. Wegener, and G. von Freymann, *Highly Selective Wet Etch for High Resolution Direct Laser Writing of Three-dimensional Nanostructures in Arsenic Sulphide All Inorganic Photoresist*, *Chem. Mater.* **19**, 4213 (2007)
- [A1.4:11] M. Thiel, M. Hermatschweiler, M. Wegener, and G. von Freymann, *Thin-film polarizer based on a 1D-3D-1D photonic crystal heterostructure*, *Appl. Phys. Lett.* **91**, 123515 (2007)
- [A1.4:12] A. Ledermann, G. von Freymann, and M. Wegener, *Photonische Quasikristalle – Laue Beugung auf dem Schreibtisch*, *Phys. Unserer Zeit* **38**, 300 (2007)
- [A1.4:13] M. Thiel, G. von Freymann, and M. Wegener, *Layer-by-layer three-dimensional chiral photonic crystals*, *Opt. Lett.* **32**, 2547 (2007)
- [A1.4:14] *‡ S.H. Wong, O. Kiowski, M. Kappes, J. Lindner, N. Mandal, F.C. Peiris, G.A. Ozin, M. Thiel, M. Braun, M. Wegener, and G. von Freymann, *Spatially localized photoluminescence at 1.5 micrometers wavelength in direct laser written 3D structures*, *Adv. Mater.* **20**, 1 (2008)
- [A1.4:15] ‡ J. Hendrickson, B.C. Richards, J. Sweet, G. Khitrova, A.N. Poddubny, E.L. Ivchenko, M. Wegener, and H.M. Gibbs, *Excitonic Polaritons in Fibonacci Quasicrystals*, *Opt. Express* **16**, 15382 (2008)

- [A1.4:16] *‡ B.C. Richards, J. Hendrickson, J. Sweet, G. Khitrova, D. Litvinov, D. Gerthsen, B. Myer, S. Pau, D. Sarid, M. Wegener, E.L. Ivchenko, A.N. Poddubny, and H.M. Gibbs, *Attempts to grow optically coupled Fibonacci-spaced InGaAs/GaAs quantum wells always result in surface gratings*, Opt. Express **16**, 21512 (2008)
- [A1.4:17] *‡ A. Ledermann, D.S. Wiersma, M. Wegener, and G. von Freymann, *Multiple scattering of light in three-dimensional photonic quasicrystals*, Opt. Express **17**, 1844 (2009)
- [A1.4:18] *‡ M. Werchner, M. Schafer, M. Kira, S.W. Koch, J. Sweet, J.D. Olitzky, J. Hendrickson, B.C. Richards, G. Khitrova, H.M. Gibbs, A.N. Poddubny, E.L. Ivchenko, M. Voronov, and M. Wegener, *One Dimensional Resonant Fibonacci Quasicrystals: Noncanonical Linear and Canonical Nonlinear Effects*, Opt. Express **17**, 6813 (2009)
- [A1.4:19] M. Thiel, M.S. Rill, G. von Freymann, and M. Wegener, *Three-dimensional bi-chiral photonic crystals*, Adv. Mater. **21**, 4680 (2009)
- [A1.4:20] *‡ J. Sweet, B.C. Richards, J.D. Olitzky, J. Hendrickson, G. Khitrova, H.M. Gibbs, D. Litvinov, D. Gerthsen, D.Z. Hu, D.M. Schaad, M. Wegener, U. Khankhoje, and A. Scherer, *GaAs photonic crystal slab nanocavities: growth, fabrication, and quality factor*, Photonics and Nanostructures **8**, 1 (2010)
- [A1.4:21] A. Chernikov, S. Horst, S.W. Koch, S. Chatterjee, W.W. Rühle, J. Sweet, B. Richards, J. Hendrickson, G. Khitrova, H.M. Gibbs, D. Litvinov, D. Gerthsen, and M. Wegener, *Intra-dot relaxation and dephasing rates from time-resolved photoluminescence from InAs quantum dot ensembles*, Solid State Commun. **149**, 1485 (2009)
- [A1.4:22] * F. Klein, T. Striebel, J. Fischer, Z. Jiang, C. Franz, G. von Freymann, M. Wegener, and M. Bastmeyer, *Tailored three-dimensional microstructure templates for cell growth studies*, Adv. Mater. **22**, 868 (2010)
- [A1.4:23] * G. von Freymann, A. Ledermann, M. Thiel, I. Staude, S. Essig, K. Busch, and M. Wegener, *Three-Dimensional Nanostructures for Photonics*, Adv. Funct. Mater. **20**, 1038 (2010)
- [A1.4:24] M. Thiel, H. Fischer, G. von Freymann, and M. Wegener, *Three-dimensional chiral photonic superlattices*, Opt. Lett. **35**, 166 (2010)
- [A1.4:25] A. Ledermann, M. Wegener, and G. von Freymann, *Rhombicuboctahedral three-dimensional photonic quasicrystals*, Adv. Mater. **22**, 2363 (2010)
- [A1.4:26] * I. Staude, M. Thiel, S. Essig, C. Wolff, K. Busch, G. von Freymann, and M. Wegener, *Fabrication and characterization of silicon woodpile photonic crystals with a complete band gap at telecom wavelengths*, Opt. Lett. **35**, 1094 (2010)
- [A1.4:27] J. Fischer, G. von Freymann, and M. Wegener, *The materials challenge in diffraction-unlimited direct-laser-writing optical lithography*, Adv. Mater. **22**, 3578 (2010)
- [A1.4:28] M. Thiel, J. Fischer, G. von Freymann, and M. Wegener, *Direct laser writing of three-dimensional submicron structures using a continuous-wave laser at 532 nm*, Appl. Phys. Lett. **97**, 221102 (2010)
- [A1.4:29] * F. Klein, B. Richter, T. Striebel, C.M. Franz, G. von Freymann, M. Wegener, and M. Bastmeyer, *Two-component Polymer Scaffolds for Controlled Three-dimensional Cell Culture*, Adv. Mater. **23**, 1341 (2011)

- [A1.4:30] * I. Staude, G. von Freymann, S. Essig, K. Busch, and M. Wegener, *Waveguides in three-dimensional photonic-band-gap materials by direct laser writing and silicon double inversion*, Opt. Lett. **36**, 67 (2011)
- [A1.4:31] *‡ J. Hendrickson, M. Helfrich, M. Gehl, D. Hu, D. Schaadt, S. Linden, M. Wegener, B. Richards, H. Gibbs, and G. Khitrova, *InAs quantum dot site-selective growth on GaAs substrates*, phys. stat. sol. (c) **8**, 1242 (2011)
- [A1.4:32] *‡ M. Helfrich, D.Z. Hu, J. Hendrickson, M. Gehl, D. Rülke, R. Gröger, D. Litvinov, S. Linden, M. Wegener, D. Gerthsen, T. Schimmel, M. Hetterich, H. Kalt, G. Khitrova, H.M. Gibbs, and D.M. Schaadt, *Growth and annealing of InAs quantum dots on pre-structured GaAs substrates*, J. Crystal Growth **323**, 187 (2011)
- [A1.4:33] * M. Thiel, J.K. Gansel, M. Wegener, and G. von Freymann, *Künstliche chirale Materialien: Wenn das Licht den Dreh raus hat*, Phys. Unserer Zeit **42**, 70 (2011)
- [A1.4:34] * T.J.A. Wolf, J. Fischer, M. Wegener, and A.-N. Unterreiner, *Pump-probe spectroscopy on photoinitiators for stimulated-emission-depletion optical lithography*, Opt. Lett. **36**, 3188 (2011)
- [A1.4:35] J. Fischer and M. Wegener, *Three-dimensional direct laser writing inspired by stimulated-emission-depletion microscopy*, Opt. Mater. Express **1**, 614 (2011)

A1.5 ,Photonic Metamaterials‘ (M. Wegener, S. Linden)

- [A1.5:1] ‡ S. Linden, C. Enkrich, G. Dolling, M.W. Klein, J. Zhou, T. Koschny, C.M. Soukoulis, S. Burger, F. Schmidt, and M. Wegener, *Photonic Metamaterials: Magnetism at Optical Frequencies*, IEEE J. Sel. Top. Quant. **12**, 1097 (2006)
- [A1.5:2] ‡ G. Dolling, M. Wegener, S. Linden, and C. Hormann, *Photorealistic images of objects in effective negative-index materials*, Opt. Express **14**, 1842 (2006)
- [A1.5:3] ‡ M.W. Klein, C. Enkrich, M. Wegener, C.M. Soukoulis, and S. Linden, *Single-slit split-ring resonators at optical frequencies: Limits of size scaling*, Opt. Lett. **31**, 1259 (2006)
- [A1.5:4] ‡ G. Dolling, C. Enkrich, M. Wegener, C.M. Soukoulis, and S. Linden, *Observation of simultaneous negative phase and group velocity of light*, Science **312**, 892 (2006)
- [A1.5:5] ‡ G. Dolling, C. Enkrich, M. Wegener, C.M. Soukoulis, and S. Linden, *A low-loss negative-index metamaterial at telecommunication wavelengths*, Opt. Lett. **31**, 1800 (2006)
- [A1.5:6] S. Linden, M. Decker, and M. Wegener, *One-dimensional magnetic photonic crystals*, Phys. Rev. Lett. **97**, 083902 (2006)
- [A1.5:7] M.W. Klein, C. Enkrich, M. Wegener, and S. Linden, *Second-harmonic generation from magnetic metamaterials*, Science **313**, 502 (2006)
- [A1.5:8] G. Dolling, S. Linden, and M. Wegener, *Metamaterialien: Licht im Rückwärtsgang*, Phys. Unserer Zeit **37**, 157 (2006)
- [A1.5:9] S. Linden and M. Wegener, *Metamaterialien werden sichtbar*, Physik Journal **5**, 29 (2006)
- [A1.5:10] ‡ G. Dolling, M. Wegener, A. Schädle, S. Burger, and S. Linden, *Observation of magnetization waves in negative-index photonic metamaterials*, Appl. Phys. Lett. **89**, 231118 (2006)
- [A1.5:11] ‡ G. Dolling, M. Wegener, C.M. Soukoulis, and S. Linden, *Negative-index metamaterial at 780 nm wavelength*, Opt. Lett. **32**, 53 (2007)
- [A1.5:12] G. Dolling, M. Wegener, and S. Linden, *Der falsche Knick im Licht*, Phys. Unserer Zeit **38**, 24 (2007)
- [A1.5:13] ‡ C.M. Soukoulis, S. Linden, and M. Wegener, *Negative refractive index at optical wavelengths*, Science **315**, 47 (2007)
- [A1.5:14] N. Feth, C. Enkrich, M. Wegener, and S. Linden, *Large-area magnetic metamaterials via compact interference lithography*, Opt. Express **15**, 501 (2007)
- [A1.5:15] G. Dolling, M. Wegener, and S. Linden, *Realization of a three-functional-layer negative-index photonic metamaterial*, Opt. Lett. **32**, 551 (2007)
- [A1.5:16] M. Decker, M.W. Klein, M. Wegener, and S. Linden, *Circular dichroism of planar chiral magnetic metamaterials*, Opt. Lett. **32**, 856 (2007)
- [A1.5:17] M.W. Klein, N. Feth, M. Wegener, and S. Linden, *Experiments on second- and third-harmonic generation from magnetic metamaterials*, Opt. Express **15**, 5238 (2007)
- [A1.5:18] M. Wegener, G. Dolling, and S. Linden, *Backward waves moving forward*, Nature Mater. **6**, 475 (2007)
- [A1.5:19] ‡ G. Dolling, M. Wegener, C.M. Soukoulis, and S. Linden, *Design-related losses of double-fishnet negative-index photonic metamaterials*, Opt. Express **15**, 11536 (2007)

- [A1.5:20] ‡ G. Dolling, M.W. Klein, M. Wegener, A. Schädle, B. Kettner, S. Burger, and S. Linden, *Negative beam displacements from negative-index photonic metamaterials*, Opt. Express **15**, 14219 (2007)
- [A1.5:21] M.S. Rill, C. Plet, M. Thiel, G. von Freymann, S. Linden, and M. Wegener, *Photonic Metamaterials by Direct Laser Writing and Silver Chemical Vapor Deposition*, Nature Mater. **7**, 543 (2008)
- [A1.5:22] * M. Husnik, M.W. Klein, N. Feth, M. König, J. Niegemann, K. Busch, S. Linden, and M. Wegener, *Absolute Extinction Cross Section of Individual Magnetic Split-Ring Resonators*, Nature Photonics **2**, 614 (2008)
- [A1.5:23] ‡ N. Feth, S. Linden, M.W. Klein, M. Decker, F.B.P. Niesler, Y. Zeng, W. Hoyer, J. Liu, S.W. Koch, J.V. Moloney, and M. Wegener, *Second-harmonic generation from complementary split-ring resonators*, Opt. Lett. **33**, 1975 (2008)
- [A1.5:24] ‡ M. Wegener, J.L. Garcia Pomar, N. Meinzer, M. Ruther, and S. Linden, *Toy model for plasmonic metamaterial resonances coupled to two-level system gain*, Opt. Express **16**, 19785 (2008)
- [A1.5:25] M.S. Rill, C.E. Kriegler, M. Thiel, G. von Freymann, S. Linden, and M. Wegener, *Negative-index bianisotropic photonic metamaterial fabricated by direct laser writing and silver shadow evaporation*, Opt. Lett. **34**, 19 (2009)
- [A1.5:26] * C.E. Kriegler, M.S. Rill, M. Thiel, E. Müller, S. Essig, A. Frölich, G. von Freymann, S. Linden, D. Gerthsen, H. Hahn, K. Busch, and M. Wegener, *Transition between corrugated metal films and split-ring-resonator arrays*, Appl. Phys. B **96**, 749 (2009)
- [A1.5:27] M. Decker, S. Linden, and M. Wegener, *Coupling effects in low-symmetry planar split-ring resonator arrays*, Opt. Lett. **34**, 1579 (2009)
- [A1.5:28] M. Wegener and S. Linden, *Giving light yet another new twist*, Physics **2**, 3 (2009)
- [A1.5:29] ‡ A. Fang, Th. Koschny, M. Wegener, and C.M. Soukoulis, *Self-consistent calculation of metamaterials with gain*, Phys. Rev. B **79**, 241104(R) (2009)
- [A1.5:30] * F.B.P. Niesler, N. Feth, S. Linden, J. Niegemann, J. Gieseler, K. Busch, and M. Wegener, *Second-harmonic generation from split-ring resonators on a GaAs substrate*, Opt. Lett. **34**, 1997 (2009)
- [A1.5:31] * J.K. Gansel, M. Thiel, M.S. Rill, M. Decker, K. Bade, V. Saile, G. von Freymann, S. Linden, and M. Wegener, *Gold helix photonic metamaterial as broadband circular polarizer*, Science **325**, 1513 (2009)
- [A1.5:32] ‡ M. Decker, M. Ruther, C. Kriegler, J. Zhou, C.M. Soukoulis, S. Linden, and M. Wegener, *Strong optical activity from twisted-cross photonic metamaterials*, Opt. Lett. **34**, 2501 (2009)
- [A1.5:33] M. Decker, S. Burger, S. Linden, and M. Wegener, *Magnetization waves in split-ring-resonator arrays: Evidence for retardation effects*, Phys. Rev. B **80**, 193102 (2009)
- [A1.5:34] J.C. Halimeh, T. Ergin, J. Mueller, N. Stenger, and M. Wegener, *Photorealistic images of carpet cloaks*, Opt. Express **17**, 19328 (2009)
- [A1.5:35] C.E. Kriegler, M.S. Rill, S. Linden, and M. Wegener, *Bianisotropic photonic metamaterials*, IEEE J. Sel. Top. Quant. **16**, 367 (2010)
- [A1.5:36] * N. Feth, M. König, M. Husnik, K. Stannigel, J. Niegemann, K. Busch, M. Wegener, and S. Linden, *Electromagnetic interaction of split-ring resonators: The role of separation and relative orientation*, Opt. Express **18**, 6545 (2010)

- [A1.5:37] J.K. Gansel, M. Wegener, S. Burger, and S. Linden, *Gold helix photonic metamaterials: A numerical parameter study*, Opt. Express **18**, 1059 (2010)
- [A1.5:38] ‡ * T. Ergin, N. Stenger, P. Brenner, J.B. Pendry, and M. Wegener, *Three-Dimensional Invisibility Cloak at Optical Wavelengths*, Science **328**, 337 (2010)
- [A1.5:39] ‡ M. Decker, R. Zhao, C.M. Soukoulis, S. Linden, and M. Wegener, *Twisted split-ring-resonator photonic metamaterial with huge optical activity*, Opt. Lett. **35**, 1593 (2010)
- [A1.5:40] ‡ M. Burresi, D. Diessel, D. van Osten, S. Linden, M. Wegener, and L. Kuipers, *Phase-sensitive near-field optical microscopy on negative-index metamaterials*, Nano Lett. **10**, 2480 (2010)
- [A1.5:41] T. Ergin, J.C. Halimeh, N. Stenger, and M. Wegener, *Optical microscopy of 3D carpet cloaks: ray-tracing simulations*, Opt. Express **18**, 20535 (2010)
- [A1.5:42] * L. Shao, M. Ruther, S. Linden, S. Essig, K. Busch, J. Weissmüller, and M. Wegener, *Electrochemical Modulation of Photonic Metamaterials*, Adv. Mater. **22**, 5173 (2010)
- [A1.5:43] M. Wegener and S. Linden, *Shaping Optical Space with Metamaterials*, Physics Today **63**, 32 (2010)
- [A1.5:44] D. Diessel, M. Decker, S. Linden, and M. Wegener, *Near-field optical experiments on low-symmetry split-ring-resonator arrays*, Opt. Lett. **35**, 3661 (2010)
- [A1.5:45] ‡ * N. Meinzer, M. Ruther, S. Linden, C.M. Soukoulis, G. Khitrova, J. Hendrickson, J.D. Olitzky, H.M. Gibbs, and M. Wegener, *Arrays of Ag split-ring resonators coupled to InGaAs single-quantum-well gain*, Opt. Express **18**, 24140 (2010)
- [A1.5:46] ‡ R. Schmied, J.C. Halimeh, and M. Wegener, *Conformal carpet and grating cloaks*, Opt. Express **18**, 24361 (2010)
- [A1.5:47] C.M. Soukoulis and M. Wegener, *Optical Metamaterials: More Bulky and Less Lossy*, Science **330**, 1633 (2010)
- [A1.5:48] * M. Ruther, L. Shao, S. Linden, J. Weissmüller, and M. Wegener, *Electrochemical Restructuring of Plasmonic Metamaterials*, Appl. Phys. Lett. **98**, 013112 (2011)
- [A1.5:49] ‡ G. Boudarham, N. Feth, V. Myroshnychenko, S. Linden, J. Garcia de Abajo, M. Wegener, and M. Kociak, *Spectral Imaging of Individual Split-Ring Resonators*, Phys. Rev. Lett. **105**, 255501 (2010)
- [A1.5:50] F.B.P. Niesler, N. Feth, S. Linden, and M. Wegener, *Second-harmonic optical spectroscopy on split-ring-resonator arrays*, Opt. Lett. **36**, 1533 (2011)
- [A1.5:51] J. Fischer, T. Ergin, and M. Wegener, *Three-dimensional polarization-independent visible-frequency carpet invisibility cloak*, Opt. Lett. **36**, 2059 (2011)
- [A1.5:52] ‡ J.C. Halimeh, R. Schmied, and M. Wegener, *Newtonian photorealistic ray tracing of grating cloaks and correlation-function-based cloaking-quality assessment*, Opt. Express **19**, 6078 (2011)
- [A1.5:53] ‡ M. Decker, N. Feth, C.M. Soukoulis, S. Linden, and M. Wegener, *Retarded long-range interaction in split-ring-resonator square arrays*, Phys. Rev. B **84**, 085416 (2011)
- [A1.5:54] J. Müller, T. Ergin, N. Stenger, and M. Wegener, *Doppelt oder gar nicht sehen*, Physik Journal **3**, 16 (2011)

- [A1.5:55] ‡ M.J. Huttunen, G. Bautista, M. Decker, S. Linden, M. Wegener, and M. Kauranen, *Nonlinear chiral imaging of subwavelength-sized twisted-cross gold nanodimers*, Opt. Mater. Express **1**, 46 (2011)
- [A1.5:56] ‡ C.M. Soukoulis and M. Wegener, *Past achievements and future challenges in the development of three-dimensional photonic metamaterials*, Nature Photonics **5**, 523 (2011)
- [A1.5:57] A. Frölich and M. Wegener, *Spectroscopic characterization of highly doped ZnO by atomic-layer deposition for three-dimensional infrared metamaterials*, Opt. Mater. Express **1**, 883 (2011)
- [A1.5:58] T. Ergin, J. Fischer, and M. Wegener, *Optical phase cloaking of 700-nm light waves in the far field by a three-dimensional carpet cloak*, Phys. Rev. Lett. **107**, 173901 (2011)
- [A1.5:59] ‡ * N. Meinzer, M. König, M. Ruther, S. Linden, G. Khitrova, H.M. Gibbs, K. Busch, and M. Wegener, *Distance-dependence of the coupling between splitting resonators and single-quantum-well gain*, Appl. Phys. Lett. **99**, 111104 (2011)

A1.6 ,Tunable Photonic Metamaterials' (J. Weissmüller)

- [A1.4:36] * M. Ruther, L.-H. Shao, S. Linden, J. Weissmüller, M. Wegener, *Electrochemical Restructuring of Plasmonic Metamaterials*, Appl. Phys. Lett. **98**, 013112 (2011)
- [A1.4:37] L.-H. Shao, H.-J. Jin, R.N. Viswanath, and J. Weissmüller, *Different Measures for the Capillarity-driven Deformation of a Nanoporous Metal*, Europhys. Lett. **89**, 66001 (2010)
- [A1.4:38] L.H. Shao, J. Biener, D. Kramer, R.N. Viswanath, T.F. Baumann, A.V. Hamza, and J. Weissmüller, *Electrocapillary Maximum and Potential of Zero Charge of Carbon Aerogel*, Phys. Chem. Chem. Phys. **12**, 7580 (2010)
- [A1.4:39] * L.-H. Shao, M. Ruther, S. Linden, S. Essig, K. Busch, J. Weissmüller, and M. Wegener, *Electrochemical Training and Modulation of Gold Nanostructure Optical Resonances*, Adv. Mater. **22**, 5173 (2010)