

## A1.5 (S. Linden / M. Wegener)

- [A1.5:1] ‡ S. Linden, C. Enkrich, M. Wegener, J. Zhou, T. Koschny, and C.M. Soukoulis, *Magnetic response of metamaterials at 100 THz*, *Science* **306**, 1351 (2004)
- [A1.5:2] M.W. Klein, T. Tritschler, M. Wegener, and S. Linden, *Lineshape of harmonic generation on metal nanoparticles and metallic Photonic Crystal slabs*, *Phys. Rev. B* **72**, 115113 (2005)
- [A1.5:3] ‡ \* C. Enkrich, F. Pérez-Willard, D. Gerthsen, J. Zhou, C.M. Soukoulis, M. Wegener, and S. Linden, *Focused-ion-beam nanofabrication of near-infrared magnetic metamaterials*, *Adv. Mater.* **17**, 2547 (2005)
- [A1.5:4] ‡ C. Enkrich, M. Wegener, S. Linden, S. Burger, L. Zschiedrich, F. Schmidt, J. Zhou, T. Koschny, and C.M. Soukoulis, *Magnetic metamaterials at telecommunication and visible frequencies*, *Phys. Rev. Lett.* **95**, 203901 (2005)
- [A1.5:5] ‡ G. Dolling, C. Enkrich, M. Wegener, J. Zhou, C.M. Soukoulis, and S. Linden, *Cut-wire pairs and plate capacitors as magnetic atoms for optical metamaterials*, *Opt. Lett.* **30**, 3198 (2005) ‡ 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)
- [A1.5:6] ‡ G. Dolling, M. Wegener, S. Linden, and C. Hormann, *Photorealistic images of objects in effective negative-index materials*, [Opt. Express](#) **14**, 1842 (2006)
- [A1.5:7] ‡ 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)
- [A1.5:8] ‡ 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)
- [A1.5:9] ‡ 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)
- [A1.5:10] S. Linden, M. Decker, and M. Wegener, *One-dimensional magnetic photonic crystals*, [Phys. Rev. Lett.](#) **97**, 083902 (2006)
- [A1.5:11] M.W. Klein, C. Enkrich, M. Wegener, and S. Linden, *Second-harmonic generation from magnetic metamaterials*, [Science](#) **313**, 502 (2006)
- [A1.5:12] G. Dolling, S. Linden, and M. Wegener, *Metamaterialien: Licht im Rückwärtsgang*, [Phys. Unserer Zeit](#) **37**, 157 (2006)
- [A1.5:13] S. Linden and M. Wegener, *Metamaterialien werden sichtbar*, [Physik Journal](#) **5**, 29 (2006)
- [A1.5:14] ‡ 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)
- [A1.5:15] ‡ G. Dolling, M. Wegener, C.M. Soukoulis, and S. Linden, *Negative-index metamaterial at 780 nm wavelength*, [Opt. Lett.](#) **32**, 53 (2007)
- [A1.5:16] G. Dolling, M. Wegener, and S. Linden, *Der falsche Knick im Licht*, [Phys. Unserer Zeit](#) **38**, 24 (2007)
- [A1.5:17] ‡ C.M. Soukoulis, S. Linden, and M. Wegener, *Negative refractive index at optical wavelengths*, [Science](#) **315**, 47 (2007)

- [A1.5:18] N. Feth, C. Enkrich, M. Wegener, and S. Linden, *Large-area magnetic metamaterials via compact interference lithography*, [Opt. Express 15, 501 \(2007\)](#)
- [A1.5:19] G. Dolling, M. Wegener, and S. Linden, *Realization of a three-functional-layer negative-index photonic metamaterial*, [Opt. Lett. 32, 551 \(2007\)](#)
- [A1.5:20] M. Decker, M.W. Klein, M. Wegener, and S. Linden, *Circular dichroism of planar chiral magnetic metamaterials*, [Opt. Lett. 32, 856 \(2007\)](#)
- [A1.5:21] M.W. Klein, N. Feth, M. Wegener, and S. Linden, *Experiments on second- and third-harmonic generation from magnetic metamaterials*, [Opt. Express 15, 5238 \(2007\)](#)
- [A1.5:22] M. Wegener, G. Dolling, and S. Linden, *Backward waves moving forward*, [Nature Mater. 6, 475 \(2007\)](#)
- [A1.5:23] ‡ G. Dolling, M. Wegener, C.M. Soukoulis, and S. Linden, *Design-related losses of double-fishnet negative-index photonic metamaterials*, [Opt. Express 15, 11536 \(2007\)](#)
- [A1.5:24] ‡ 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 \(2007\)](#)
- [A1.5:25] 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 \(2008\)](#)
- [A1.5:26] \* 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 \(2008\)](#)
- [A1.5:27] ‡ 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 \(2008\)](#)
- [A1.5:28] ‡ 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 \(2008\)](#)
- [A1.5:29] 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 \(2009\)](#)
- [A1.5:30] \* 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 \(2009\)](#)
- [A1.5:31] M. Decker, S. Linden, and M. Wegener, *Coupling effects in low-symmetry planar split-ring resonator arrays*, [Opt. Lett. 34, 1579 \(2009\)](#)
- [A1.5:32] M. Wegener and S. Linden, *Giving light yet another new twist*, [Physics 2, 3 \(2009\)](#)
- [A1.5:33] ‡ A. Fang, Th. Koschny, M. Wegener, and C.M. Soukoulis, *Self-consistent calculation of metamaterials with gain*, [Phys. Rev. B 79, 241104\(R\) \(2009\)](#)
- [A1.5:34] \* 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 \(2009\)](#)
- [A1.5:35] \* 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 \(2009\)](#)

- [A1.5:36] ‡ 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 \(2009\)](#)
- [A1.5:37] 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 \(2009\)](#)
- [A1.5:38] J.C. Halimeh, T. Ergin, J. Mueller, N. Stenger, and M. Wegener, *Photorealistic images of carpet cloaks*, [Opt. Express \*\*17\*\*, 19328 \(2009\)](#)
- [A1.5:39] C.E. Kriegler, M.S. Rill, S. Linden, and M. Wegener, *Bianisotropic photonic metamaterials*, [IEEE J. Sel. Top. Quant. \*\*16\*\*, 367 \(2010\)](#)
- [A1.5:40] \* 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 \(2010\)](#)
- [A1.5:41] J.K. Gansel, M. Wegener, S. Burger, and S. Linden, *Gold helix photonic metamaterials: A numerical parameter study*, [Opt. Express \*\*18\*\*, 1059 \(2010\)](#)
- [A1.5:42] ‡ \* T. Ergin, N. Stenger, P. Brenner, J.B. Pendry, and M. Wegener, *Three-Dimensional Invisibility Cloak at Optical Wavelengths*, [Science \*\*328\*\*, 337 \(2010\)](#)
- [A1.5:43] ‡ 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 \(2010\)](#)
- [A1.5:44] ‡ M. Burrese, 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 \(2010\)](#)
- [A1.5:45] T. Ergin, J.C. Halimeh, N. Stenger, and M. Wegener, *Optical microscopy of 3D carpet cloaks: ray-tracing simulations*, [Opt. Express \*\*18\*\*, 20535 \(2010\)](#)
- [A1.5:46] \* L. Shao, M. Ruther, S. Linden, S. Essig, K. Busch, J. Weissmüller, and M. Wegener, *Electrochemical Modulation of Photonic Metamaterials*, [Adv. Mater. \*\*22\*\*, 5173 \(2010\)](#)
- [A1.5:47] M. Wegener and S. Linden, *Shaping Optical Space with Metamaterials*, [Physics Today \*\*63\*\*, 32 \(2010\)](#)
- [A1.5:48] D. Diessel, M. Decker, S. Linden, and M. Wegener, *Near-field optical experiments on low-symmetry split-ring-resonator arrays*, [Opt. Lett. \*\*35\*\*, 3661 \(2010\)](#)
- [A1.5:49] ‡ \* 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 \(2010\)](#)
- [A1.5:50] ‡ R. Schmied, J.C. Halimeh, and M. Wegener, *Conformal carpet and grating cloaks*, [Opt. Express \*\*18\*\*, 24361 \(2010\)](#)
- [A1.5:51] C.M. Soukoulis and M. Wegener, *Optical Metamaterials: More Bulky and Less Lossy*, [Science \*\*330\*\*, 1633 \(2010\)](#)
- [A1.5:52] \* M. Ruther, L. Shao, S. Linden, J. Weissmüller, and M. Wegener, *Electrochemical Restructuring of Plasmonic Metamaterials*, [Appl. Phys. Lett. \*\*98\*\*, 013112 \(2011\)](#)
- [A1.5:53] ‡ 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 \(2010\)](#)

- [A1.5:54] F.B.P. Niesler, N. Feth, S. Linden, and M. Wegener, *Second-harmonic optical spectroscopy on split-ring-resonator arrays*, [Opt. Lett. \*\*36\*\*, 1533 \(2011\)](#)
- [A1.5:55] J. Fischer, T. Ergin, and M. Wegener, *Three-dimensional polarization-independent visible-frequency carpet invisibility cloak*, [Opt. Lett. \*\*36\*\*, 2059 \(2011\)](#)
- [A1.5:56] ‡ 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 \(2011\)](#)
- [A1.5:57] ‡ 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 \(2011\)](#)
- [A1.5:58] J. Müller, T. Ergin, N. Stenger, and M. Wegener, *Doppelt oder gar nicht sehen*, *Physik Journal* **3**, 16 (2011)
- [A1.5:59] ‡ 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 \(2011\)](#)
- [A1.5:60] ‡ C.M. Soukoulis and M. Wegener, *Past achievements and future challenges in the development of three-dimensional photonic metamaterials*, *Nature Photon.* **5**, 523 (2011)
- [A1.5:61] 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)
- [A1.5:62] T. Ergin, J. Fischer, and M. Wegener, *Detailed optical characterization of three-dimensional visible-frequency polarization-independent carpet invisibility cloak*, *Physica B* **407**, 4075 (2012)
- [A1.5:63] ‡ J.C. Halimeh and M. Wegener, *Time-of-flight imaging of invisibility cloaks*, *Opt. Express* **20**, 63 (2012)
- [A1.5:64] T. Ergin and M. Wegener, *Transformieren und Tarnen*, *Physik Journal* **11**, 31 (2012)
- [A1.5:65] N. Stenger, M. Wilhelm, and M. Wegener, *Experiments on elastic cloaking in thin plates*, *Phys. Rev. Lett.* **108**, 014301 (2012)
- [A1.5:66] J.K. Gansel, M. Latzel, A. Frölich, J. Kaschke, M. Thiel, and M. Wegener, *Tapered-gold-helix metamaterials as improved circular polarizers*, *Appl. Phys. Lett.* **100**, 101109 (2012)
- [A1.5:67] ‡ S. Linden, F.B.P. Niesler, J. Förstner, Y. Grynko, T. Meier, and M. Wegener, *Collective effects in second-harmonic generation from split-ring-resonator arrays*, *Phys. Rev. Lett.* **109**, 015502 (2012)
- [A1.5:68] F.B.P. Niesler, J.K. Gansel, S. Fischbach, and M. Wegener, *Metamaterial metal-based bolometers*, *Appl. Phys. Lett.* **100**, 203508 (2012)
- [A1.5:69] N. Stenger and M. Wegener, *Transformationsoptik: Von der Unsichtbarkeit zur Unhörbarkeit*, *Phys. Unserer Zeit* **43**, 61 (2012)
- [A1.5:70] \* M. Husnik, S. Linden, R. Diehl, J. Niegemann, K. Busch, and M. Wegener, *Quantitative experimental determination of scattering and absorption cross-section spectra of individual optical metallic nanoantennas*, *Phys. Rev. Lett.* **109**, 233902 (2012)
- [A1.5:71] J. Kaschke, J.K. Gansel, and M. Wegener, *On metamaterial circular polarizers based on metal N-helices*, *Opt. Express* **20**, 26012 (2012)

- [A1.5:72] \* L. Shao, M. Ruther, S. Linden, M. Wegener, and J. Weissmüller, *On the mechanism of electrochemical modulation of plasmonic resonances*, Appl. Phys. Lett. **101**, 121109 (2012)
- [A1.5:73] J.C. Halimeh and M. Wegener, *Photorealistic ray tracing of free-space invisibility cloaks made of uniaxial dielectrics*, Opt. Express **20**, 28330 (2012)
- [A1.5:74] ‡ R. Schittny, M. Kadic, S. Guenneau, and M. Wegener, *Experiments on transformation thermodynamics: Molding the flow of heat*, Phys. Rev. Lett. **110**, 195901 (2013)
- [A1.5:75] M. Kadic, T. Bückmann, R. Schittny, and M. Wegener, *On anisotropic versions of three-dimensional pentamode metamaterials*, New J. Phys. **15**, 023029 (2013)
- [A1.5:76] J.C. Halimeh and M. Wegener, *Photorealistic rendering of unidirectional free-space invisibility cloaks*, Opt. Express **21**, 9457 (2013)
- [A1.5:77] M. Kadic, T. Bückmann, R. Schittny, and M. Wegener, *Metamaterials beyond electromagnetism*, Rep. Prog. Phys. **76**, 126501 (2013)
- [A1.5:78] ‡ M. Husnik, J. Niegemann, K. Busch, and M. Wegener, *Quantitative spectroscopy on individual wire, slot, bow-tie, rectangular and square-shaped optical antennas*, Opt. Lett. **38**, 4597 (2013)
- [A1.5:79] ‡ M. Husnik, F. von Cube, S. Irsen, S. Linden, J. Niegemann, K. Busch, and M. Wegener, *Comparison of electron energy-loss and quantitative optical spectroscopy on individual optical antennas*, Nanophotonics **2**, 241 (2013)
- [A1.5:80] R. Schittny, T. Bückmann, M. Kadic, and M. Wegener, *Elastic measurements on macroscopic 3D pentamode metamaterials*, Appl. Phys. Lett. **103**, 231905 (2013)
- [A1.5:81] M. Wegener, *Metamaterials beyond optics*, Science **342**, 939 (2013)

### Subproject A1.5 Invited Talks at International Conferences (2006-2013)

M. Wegener, *Photonic metamaterials: Optics starts walking on two feet*, **Invited Tutorial**, Optical Society of America (OSA) Annual Meeting “Frontiers in Optics”, Rochester (U.S.A.), October 8-12, 2006

S. Linden and M. Wegener, *Photonic crystals and metamaterials: Tailoring optical properties*, Symposium on Photonics Technologies for the 7th Framework, Wroclaw (Poland), October 12-14, 2006

M. Wegener, *Photonic Metamaterials: Linear and nonlinear optical properties*, International seminar and workshop on *Nonlinear Physics in Periodic Structures and Metamaterials*, Max Planck Institute for the Physics of Complex Systems, Dresden (Germany), March 26-30, 2007

G. Dolling, S. Linden, C.M. Soukoulis, and M. Wegener, *Negative-index metamaterials have reached the visible*, 2007 Progress in Electromagnetic Research Symposium (PIERS), Beijing (China), March 26-30, 2007

M. Wegener, *Metamaterials: Magnetism enters photonics*, Spring-Meeting of the German Physical Society (DPG), Regensburg (Germany), March 26-30, 2007

S. Linden, G. Dolling, M. Decker, C.M. Soukoulis, and M. Wegener, *Photonic Metamaterials: Artificial Magnetism, Negative Refractive Index, and Circular Dichroism at Optical Frequencies*, International Conference on “Photonic and Electromagnetic Crystal Structures (PECS-VII)”, Monterey (U.S.A.), April 8-11, 2007

M. Wegener, S. Linden, and C.M. Soukoulis, *Ultrafast spectroscopy on photonic metamaterials*, **Invited Tutorial**, International Conference on Quantum Electronics and Laser Science (QELS), Baltimore (U.S.A.), May 7-11, 2007

S. Linden, G. Dolling, M. Wegener, and C.M. Soukoulis, *Fabrication and Characterization of a Negative-Index Photonic Metamaterial with Three Functional Layers*, International Conference on Quantum Electronics and Laser Science (QELS), Baltimore (U.S.A.), May 7-11, 2007

M. Wegener, *Magnetic, double-negative, chiral, and nonlinear photonic metamaterials*, OSA Topical Meeting on "Photonic Metamaterials: From Random to Periodic", Jackson Hole WY (U.S.A.), June 4-7, 2007

M. Wegener, *Photonic metamaterials: Optics starts walking on two feet*, International Workshop on semiconductor nanostructures SEMINANO, Bad Honnef (Germany), June 13-16, 2007

M. Wegener, *Photonic Metamaterials: Optics starts walking on two feet*, International Summer School on Spectroscopy, Optical Sensing and Imaging: Status and Prospects of Present Methods and Techniques, Advanced Study Institute, Ettore Majorana Centre, Erice (Italy), June 17 - July 2, 2007

M. Wegener, S. Linden, and C.M. Soukoulis, *Photonic metamaterials: Optics starts walking on two feet, III. International Workshop on Photonic and Electronic Materials*, Donostia (San Sebastian, Spain), July 4-6, 2007

M. Wegener, *Photonic metamaterials: Optics starts walking on two feet*, International Conference on Fundamental Optical Processes in Semiconductors (FOPS 2007), Montana (U.S.A.), July 23-27, 2007

N. Feth, S. Linden, C.M. Soukoulis, and M. Wegener, *Photonic metamaterials: Opportunities for nanoimprinting*, IEEE LEOS Topical "Imprinting of Photonic Integrated Circuits", Portland (U.S.A.), July 23-25, 2007

S. Linden, C.M. Soukoulis, and M. Wegener, *Photonic metamaterials*, International Symposium on Signals, Systems and Electronics (ISSSE 2007), Montreal (Canada), July 30 - August 2, 2007

S. Linden, C.M. Soukoulis, and M. Wegener, *Metamaterials see the light*, 7th Pacific Rim Conference on Lasers and Electro-Optics (CLEO/Pacific Rim 2007), Seoul (South-Korea), August 26-31, 2007

M. Wegener, *Photonic crystals and metamaterials*, Werner and Else Heraeus Summer School *Photonics Design*, Rauschholzhhausen (Germany), September 10-14, 2007

M. Wegener, C.M. Soukoulis, and S. Linden, *Photonic crystals and metamaterials*, International NANO-2007 Symposium, Chisinau (Moldavia), September 20-22, 2007

M. Wegener, S. Linden, and C.M. Soukoulis, *Metamaterials: Magnetism Enters Photonics*, MORIS 2007 International Workshop on Thermal and Optical Magnetic Materials and Devices, Pittsburgh (U.S.A.), September 22-26, 2007

N. Feth, G. Dolling, M.W. Klein, M. Decker, S. Linden, and M. Wegener, *Photonic Metamaterials*, 9<sup>th</sup> International Conference on Laser Ablation (COLA 2007), Tenerife (Spain), September 24-28, 2007

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, International Workshop on Spin- and Optoelectronics, Berlin (Germany), September 26-29, 2007

S. Linden, C.M. Soukoulis, and M. Wegener, *Photonic Metamaterials*, First International Congress on Advanced Electromagnetic Materials in Microwave and Optics Metamaterials 2007, Rome (Italy), October 22-26, 2007

M. Wegener, *Photonic Crystals and Metamaterials: Tailored Optical Materials for the 21st Century*, NanoScience Days, Nanoscience Center, University of Jyväskylä (Finland), October 25-26, 2007

M. Wegener, C.M. Soukoulis, and S. Linden, *Photonic metamaterials: Optics starts walking on two feet*, Annual Meeting of the Danish Optical Society, Riso National Laboratory, Copenhagen (Denmark), November 22-23, 2007

M. Wegener, *3D Photonic crystals and metamaterials: Band gaps, chirality, quasicrystals, and magnetism*, Fall Meeting of the Materials Research Society (MRS), Boston (U.S.A.), November 26-30, 2007

M. Wegener, C.M. Soukoulis, and S. Linden, *Photonic metamaterials: Optics starts walking on two feet*, **Invited Plenary Talk**, *Photonics: Design, Technology, and Packaging III (AU04)*, SPIE International Symposium on Microelectronics, MEMS and Nanotechnology, Canberra (Australia), December 4-7, 2007

M. Wegener and S. Linden, *Recent Progress on Photonic Metamaterials*, 38<sup>th</sup> Winter Colloquium on the *Physics of Quantum Electronics (PQE)*, Snowbird (U.S.A.), January 6-10, 2008

M. Wegener, C.M. Soukoulis, and S. Linden, *Ultrafast spectroscopy on photonic metamaterials*, SPIE International Conference *Photonics West, Ultrafast Phenomena in Semiconductors and Nanostructure Materials XII*, San Jose (U.S.A.), January 19-24, 2008

M. Wegener and G. von Freymann, *Progress on Fabrication of Three-Dimensional Nanostructures for Photonics*, SPIE International Conference *Photonics West, Photonic Crystal Materials and Devices*, San Jose (U.S.A.), January 19-24, 2008

M. Wegener, *Periodic Nanostructures for Photonics: An Introduction*, 403<sup>rd</sup> International Seminar on *Periodic Nanostructures for Photonics*, Werner and Else Heraeus Foundation, Bad Honnef (Germany), February 27-29, 2008

M.S. Rill, M. Thiel, G. von Freymann, S. Linden, and M. Wegener, *Towards Three-Dimensional Photonic Metamaterials*, International Conference on Computational and Experimental Engineering and Sciences (ICCES 08), Honolulu (Hawaii), March 17-22, 2008

M. Wegener, G. von Freymann, and S. Linden, *Recent Progress on Photonic Metamaterials*, **Invited Keynote Talk**, SPIE Photonics Europe Congress, Strasbourg (France), April 8-10, 2008

S. Linden, M. Husnik, N. Meinzer, M.W. Klein, M.F.G. Klein, N. Feth, and M. Wegener, *Spectroscopy on individual "photonic atoms"*, SPIE Photonics Europe Congress, Strasbourg (France), April 8-10, 2008

S. Linden and M. Wegener, *Photonic Metamaterials*, International Conference on *New Frontiers in Micro and Nano Photonics*, Florence (Italy), April 23-26, 2008

M. Wegener and S. Linden, *Ultrafast Spectroscopy on Photonic Metamaterials*, 416<sup>th</sup> International Seminar on *Ultrafast Nanooptics*, Werner and Else Heraeus Foundation, Bad Honnef (Germany), June 2-4, 2008

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Plenary Talk**, 21<sup>st</sup> Congress of the International Commission for Optics (in 2008 incorporating the Australian Optical Society Conference), Sydney (Australia), July 7-10, 2008

M. Wegener, *Metamaterials at Infrared and Visible Frequencies*, Gordon Research Conference on *Plasmonics – Optics at the Nanoscale*, Tilton, New Hampshire (U.S.A.), July 27 - August 1, 2008

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Plenary Talk**, IEEE-LEOS 2008 International Conference on Optical MEMS & Nanophotonics, Freiburg (Germany), August 11-14, 2008

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Plenary Talk**, 35<sup>th</sup> International Symposium on Compound Semiconductors 2008 (ISCS 2008), Rust (Germany), September 21-24, 2008

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Plenary Talk**, *Metamaterials 2008*, 2<sup>nd</sup> International Congress on Advanced Electromagnetic Materials in Microwave and Optics, Pamplona (Spain), September 21-26, 2008

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Plenary Talk**, International Workshop on Computational and Theoretical Nano-Photonics (IWCTNP), Bad Honnef (Germany), December 3-5, 2008

M.S. Rill, C. Plet, M. Thiel, A. Frölich, I. Staude, M. Wegener, G. von Freymann, and S. Linden, *Towards 3D Isotropic Photonic Metamaterials via Direct Laser Writing*, The 2nd European Topical Meeting on Nanophotonics and Metamaterials, Seefeld (Austria), January 5-8, 2009

S. Linden, N. Feth, M. Husnik, M. Wegener, M. König, J. Niegemann, and K. Busch, *Spectroscopy of individual split-ring resonators*, The 2nd European Topical Meeting on Nanophotonics and Metamaterials, Seefeld (Austria), January 5-8, 2009

M. Wegener, *Photonic Metamaterials: Recent Progress*, IEEE/LEOS Winter Topical Meeting on *Nanophotonics*, Innsbruck (Austria), January 12-14, 2009

M. Wegener and S. Linden, *Photonic Metamaterials: Recent Progress*, Annual Dutch Physics Meeting "Physics@FOM 2009", Veldhoven (The Netherlands), January 20-21, 2009

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, European Action COST Training School on "Nonlinear Nanophotonics", Metz (France), March 23-25, 2009

M. Wegener and S. Linden, *Photonic Metamaterials: Recent Progress*, PECS VIII – The 8th International Photonic & Electromagnetic Crystal Structures Meeting, Cockle Bay Warf, Sydney (Australia), April 5-9, 2009

S. Linden, K. Busch, N. Feth, G. von Freymann, J.K. Gansel, H. Hein, M. Husnik, P.-J. Jakobs, M.F.G. Klein, M. König, N. Meinzer, J. Niegemann, C. Plet, M. Rill, C.M. Soukoulis, M. Thiel, and M. Wegener, *Recent Progress on Photonic Metamaterials*, Spring Meeting of the Materials Research Society (MRS), San Francisco (U.S.A.), April 13-17, 2009

M. Wegener, *Photonic Metamaterials: Quo Vadis?*, **Invited Plenary Talk**, 8th International Conference on "Electrical, Transport and Optical Properties of Inhomogeneous Media (ETOPIM 8)", Rethymnon, Crete (Greece), June 7-12, 2009

M. Wegener, *Photonic Metamaterials: Recent Progress*, European Quantum Electronics Conference (EQEC) 2009, Munich (Germany), June 14-19, 2009

M. Wegener and S. Linden, *Photonic Metamaterials: Recent Progress*, International Conference on "Surface Plasmon Photonics-4 (SPP4)", Amsterdam (The Netherlands), June 21-26, 2009

M. Wegener, *Photonic Metamaterials: Magnetism Enters Photonics*, **Invited Plenary Talk**, International Conference on Magnetism 2009 (ICM'09), Karlsruhe (Germany), July 26-31, 2009

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Plenary Talk**, SPIE 2009 Optics and Photonics Meeting, San Diego (U.S.A.), August 2-6, 2009

M. Wegener, *Photonic Metamaterials: Three-Dimensional Structures and Loss Compensation*, "Metal Nanostructures and Their Optical Properties VII", SPIE 2009 Optics and Photonics Meeting, San Diego (U.S.A.), August 2-6, 2009

M. Wegener, M. Decker, and S. Linden, *Interaction Effects in Low-Symmetry Split-Ring Resonator Arrays*, "Metamaterials: Fundamentals and Applications II", SPIE 2009 Optics and Photonics Meeting, San Diego (U.S.A.), August 2-6, 2009



S. Linden, N. Feth, M. Husnik, M. König, J. Niegemann, K. Busch, and M. Wegener, *Spectroscopy of individual photonic atoms*, "Metamaterials: Fundamentals and Applications II", SPIE 2009 Optics and Photonics Meeting, San Diego (U.S.A.), August 2-6, 2009

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, Summer School "New Frontiers in Optical Technologies", Tampere (Finland), August 10-14, 2009

M. Wegener, *Photonic Metamaterials: Recent Progress*, Fall Meeting of the Material Research Society (MRS) of America, Boston (U.S.A.), November 30 - December 4, 2009

M. Wegener, *Towards 3D photonic metamaterials*, **Invited Plenary Talk**, 40th Winter Colloquium on the *Physics of Quantum Electronics (PQE)*, Snowbird (U.S.A.), January 3-7, 2010

J.K. Gansel, M. Thiel, M.S. Rill, M. Decker, K. Bade, V. Saile, G. von Freymann, S. Linden, and M. Wegener, *Three-dimensional gold-helix photonic metamaterials made via two-photon direct laser writing*, International Conference Photonics West, "Synthesis and Photonics of Nanoscale Materials VII", San Francisco (U.S.A.), January 25-28, 2010

M. Wegener, *3D Chiral photonic crystals and metamaterials*, **Invited Plenary Talk**, 2nd International Conference on "Metamaterials, Photonic Crystals and Plasmonics", Cairo (Egypt), February 22-25, 2010

M. Wegener, *Photonic Crystals and Metamaterials*, "19. Diskussionstagung Anorganisch-Technische Chemie", DECHEMA House, Frankfurt (Germany), February 18-19, 2010

M. Wegener, *3D Photonic Metamaterials Made by Direct Laser Writing*, March Meeting of the American Physical Society (APS), "Celebrating 50 Years of Lasers in Condensed Matter Physics: Surfaces, Imaging & Technology", Portland (U.S.A.), March 15-19, 2010

M. Wegener, *Fabrication and characterization of chiral photonic metamaterials*, **Invited Tutorial**, MRS Spring Meeting, San Francisco (U.S.A.), April 5-9, 2010

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, **Invited Tutorial**, 15th European Conference on Integrated Optics (ECIO 10), Cambridge (United Kingdom), April 7-9, 2010

S. Linden, J.K. Gansel, M. Decker, and M. Wegener, *Chiral metamaterials for optical frequencies*, SPIE Photonics Europe, Brussels (Belgium), April 12-16, 2010

M. Wegener, *Photonic metamaterials go three-dimensional*, International Conference on Quantum Electronics and Laser Science (QELS), San Jose (U.S.A.), May 16-21, 2010

M. Wegener, *Photonic Metamaterials: Recent Progress*, Royal Society Theo Murphy Discussion Meeting on *Metallic metamaterials and plasmonics*, Kavli Royal Society International Centre for the Advancement of Science, Chicheley Hall (United Kingdom), June 2-3, 2010

M. Wegener, *Photonic metamaterials: recent progress*, CIMTEC 2010, 5th Forum on New Materials, Montecatini (Italy), June 13-18, 2010

M. Wegener, *3D Photonic Metamaterials Made by Direct Laser Writing*, **Invited Plenary Talk**, "Bragg Gratings, Photosensitivity and Poling in Glass Waveguides", OSA Optics & Photonics Congress, Karlsruhe (Germany), June 21-24, 2010

K. Busch and M. Wegener, *Photonic Crystals and Photonic Metamaterials*, European Summer Campus 2010, *Metamaterials: "Why light bends the wrong way", "Why things don't fall down"*, Strasbourg (France), June 27 - July 5, 2010

M. Wegener, *3D Photonic Metamaterials and Transformation Optics*, IV. International Workshop on Photonic and Electronic Materials, Donostia (San Sebastian, Spain), July 5-7, 2010

N. Stenger, T. Ergin, and M. Wegener, *Experiments on transformation optics in three dimensions*, *Metamaterials: Fundamentals and Applications III*, SPIE 2009 Optics and Photonics Meeting, San Diego (U.S.A.), August 1-5, 2010

M. Wegener, *Photonic metamaterials and transformation optics*, iNANO International summer school in advanced photonics, Fuglsocenter (Denmark), September 3-7, 2010

N. Stenger, T. Ergin, J.C. Halimeh, and M. Wegener, *3D Optical Carpet Cloak*, Fourth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics *Metamaterials 2010*, Karlsruhe (Germany), September 13-16, 2010

J.K. Gansel, M. Thiel, M.S. Rill, M. Decker, K. Bade, V. Saile, S. Burger, G. von Freymann, S. Linden, and M. Wegener, *Three-dimensional photonic metamaterials made by direct laser writing*, Fourth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics *Metamaterials 2010*, Karlsruhe (Germany), September 13-16, 2010

S. Linden, N. Feth, M. Decker, M. König, J. Niegemann, K. Busch, and M. Wegener, *Electromagnetic interaction of split-ring resonators: The role of separation and relative orientation*, Fourth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics *Metamaterials 2010*, Karlsruhe (Germany), September 13-16, 2010

M. Wegener, *Photonic Metamaterials: Recent Progress*, PECS IX – The 9th International Photonic & Electromagnetic Crystal Structures Meeting, Granada (Spain), September 26-30, 2010

M. Wegener, *Photonic Metamaterials*, “Micro-Optics” Meeting, European Optical Society Annual Meeting, Paris (France), October 26-28, 2010

N. Meinzer, M. Ruther, S. Linden, C.M. Soukoulis, G. Khitrova, J. Hendrickson, J.D. Olitzky, H.M. Gibbs, and M. Wegener, *Plasmonic Metamaterials Coupled to Single-Quantum-Well Gain*, 41st Winter Colloquium on the *Physics of Quantum Electronics (PQE)*, Snowbird (U.S.A.), January 2-6, 2011

M. Wegener, *3D Metamaterials and Transformation Optics*, The 3rd International Topical Meeting on Nanophotonics and Metamaterials, NANOMETA 2011, Seefeld (Austria), January 3-6, 2011

M. Wegener, *Three-dimensional diffraction-unlimited direct-laser-writing optical lithography*, International Workshop “Laser Based Micromanufacturing – From Surface Structuring to Metamaterials”, Erlangen (Germany), January 10-11, 2011

T. Ergin, N. Stenger, J.C. Halimeh, and M. Wegener, *3D invisibility cloaks at optical frequencies*, International Conference *Photonics West*, San Francisco (U.S.A.), January 22-27, 2011

M. Wegener, *3D Photonic Metamaterials and Invisibility Cloaks: The Making Of*, **Invited Plenary Keynote Talk**, The 24th International Conference on Micro Electro Mechanical Systems (MEMS 2011), Cancun (Mexico), January 23-27, 2011

M. Wegener, *Photonic Metamaterials and Transformation Optics: Recent Progress*, Spring-Meeting of the German Physical Society (DPG), Dresden (Germany), March 13-18, 2011

M. Wegener, *3D Photonic Metamaterials and Transformation Optics*, **Invited Plenary Talk**, International Conference on Nanophotonics (ICNP), Shanghai (China), May 22-26, 2011

M. Wegener, *Photonic Metamaterials: Optics Starts Walking on Two Feet*, International Summer School on *Nano-optics: plasmonics, photonic crystals, metamaterials, and sub-wavelength resolution*, Advanced Study Institute, Ettore Majorana Centre, Erice (Italy), June 30 - July 15, 2011

M. Wegener, *Photonic Metamaterials and Transformation Optics*, **Invited Plenary Talk**, International Conference on *Fundamental Optical Processes in Semiconductors (FOPS 2011)*, Lake Junaluska, North Carolina (U.S.A.), August 1-5, 2011

M. Wegener, *Photonic Metamaterials: Recent Progress*, 500th International Heraeus Seminar on Highlights of Quantum Optics, Werner and Else Heraeus Foundation, Bad Honnef (Germany), May 7-11, 2012

M. Wegener, *3D Photonic Metamaterials and Transformation Optics*, **Invited Plenary Talk**, 3M-NANO International Conference, Xi'an (China), August 29 - September 1, 2012

M. Wegener, *Recent Progress on Optical Metamaterials and Transformation Optics*, **Invited Keynote Talk**, International Conference META'12, Paris (France), April 19-22, 2012

M. Wegener, *Metamaterials and transformation optics*, **Invited Plenary Talk** ("Festvortrag"), Spring meeting of the German Physical Society (DPG), Berlin (Germany), March 25-30, 2012

M. Wegener, *3D Photonic Metamaterials and Transformation Optics*, **Invited Plenary Talk**, IEEE Photonics Society Conference (IPC), Burlingame (U.S.A.), September 23-27, 2012

M. Wegener, *Recent experimental progress in 3D transformation optics and optical metamaterials*, 5th GCOE International Symposium on Photonics and Electronics Science and Engineering, Kyoto (Japan), March 9, 2012

M. Wegener, *Recent experimental progress on metamaterials*, The Tenth International Congress on Photonic and Electromagnetic Crystal Structures (PECS-X), Santa Fe (U.S.A.), June 3-8, 2012

M. Wegener, *Recent experimental progress on transformation media*, **Invited Plenary Talk**, The 9th International Conference on Electrical, Transport and Optical Properties of Inhomogeneous Media (ETOPIM 9), Marseille (France), September 2-7, 2012

M. Wegener, *Optical and mechanical metamaterials*, **Invited Keynote Talk**, 19th International Conference on Computational and Experimental Engineering and Sciences (ICCES'12), Crete (Greece), April 30 - May 4, 2012

M. Husnik, R. Diehl, J. Niegemann, K. Busch, S. Linden, and M. Wegener, *Quantitative measurement of scattering and absorption cross sections of individual metal nanoantennas*, **Invited Keynote Talk**, Metamaterials: Fundamentals and Applications V, SPIE 2012 Optics and Photonics Meeting, San Diego (U.S.A.), August 12-16, 2012

M. Wegener, *Three-dimensional photonic metamaterials*, International Workshop on Nanophotonics, Trieste (Italy), December 3-7, 2012

M. Wegener, *Metamaterials for Transformation-Physics*, International Student Conference on Microtechnology, Freiburg (Germany), October 8-14, 2012

M. Wegener, *Recent progress on metamaterials for transformation physics*, The 4th International Topical Meeting on Nanophotonics and Metamaterials, NANOMETA2013, Seefeld (Austria), January 3-6, 2013

T. Bückmann, R. Schittny, A. Frölich, M. Thiel, A. Martin, M. Kadic, and M. Wegener, *Three-dimensional mechanical metamaterials made by dip-in direct laser writing*, International Conference Photonics West, Advanced Fabrication Technologies for Micro/Nano Optics and Photonics VI, San Francisco (U.S.A.), February 2-7, 2013

Y. Grynko, T. Meier, S. Linden, F.B.P. Niesler, M. Wegener, and J. Förstner, *Optimal second-harmonic generation in split-ring resonator arrays*, International Conference Photonics West, Ultrafast Phenomena and Nanophotonics XVII, San Francisco (U.S.A.), February 2-7, 2013

S. Linden, F.B.P. Niesler, J. Förstner, Y. Grynko, T. Meier, and M. Wegener, *Collective phenomena in photonic metamaterials*, International Conference Photonics West, Ultrafast Phenomena and Nanophotonics XVII, San Francisco (U.S.A.), February 2-7, 2013

M. Wegener, *Photonic Metamaterials*, 6th Annual Meeting on Photonic Devices, Zuse-Institut Berlin ZIB (Germany), February 21-22, 2013

R. Schittny, M. Kadic, S. Guenneau, and M. Wegener, *Experiments on transformation thermodynamics: Molding the flow of heat*, 4th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META13), Dubai (United Arab Emirates), March 18-23, 2013

J. Kaschke and M. Wegener, *Photonic Metamaterials: Recent Progress*, Symposium on "Resonant Optics in Metallic and Dielectric Structures: Fundamentals and Applications", Spring Meeting of the Material Research Society (MRS) of America, San Francisco (U.S.A.), April 1-4, 2013

M. Wegener, *Transformation materials for optics, elastodynamics, and thermodynamics*, International workshop "Controlling the propagation of waves in complex media: from shaping wavefields to designing smart materials", Cargese, Corsica (France), May 27 - June 1, 2013

M. Wegener, *Fabrication of 3D metamaterials*, Doctoral School EUPROMETA of Metamorphose VI, Glasgow (U.K.), June 17-21, 2013

M. Wegener, *Photonic Metamaterials and Transformation Optics*, International Summer School on "Nanostructures for optics and photonics", Advanced Study Institute, Ettore Majorana Centre, Erice (Italy), July 4-19, 2013

M. Wegener, *3D optical metamaterials and transformation optics*, Third Summer School on Plasmonics (SSOP3), Cargese (France), July 28 - August 3, 2013

J. Kaschke, J.K. Gansel, J. Fischer, M. Thiel, and M. Wegener, *Recent experimental progress on quadrupel-helix based metamaterials*, Metamaterials: Fundamentals and Applications VI, SPIE 2012 Optics and Photonics Meeting, San Diego (U.S.A.), August 25-29, 2013

M. Wegener, *Metamaterials Beyond Electromagnetism*, **Invited Plenary Talk**, The 7th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Bordeaux (France), September 15-20, 2013

M. Wegener, *Spectroscopy on individual metamaterial building blocks*, MRS Fall Meeting, Boston (U.S.A.), December 1-6, 2013