

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)

Project A2 ‘Spintronics’

A2.3 ‘Spin Injection, Manipulation, and Read-Out’ (H. Kalt, M. Hetterich)

- [A2.3:1] * W. Löffler, D. Tröndle, J. Fallert, H. Kalt, D. Litvinov, D. Gerthsen, J. Lupaca-Schomber, T. Passow, B. Daniel, J. Kvietkova, M. Grün, C. Klingshirn, and M. Hetterich, *Electrical spin injection from ZnMnSe into InGaAs quantum wells and quantum dots*, Appl. Phys. Lett. **88**, 062105 (2006)
- [A2.3:2] * W. Löffler, D. Tröndle, H. Kalt, D. Litvinov, D. Gerthsen, J. Lupaca-Schomber, T. Passow, B. Daniel, J. Kvietkova, and M. Hetterich, *Electrical spin injection from ZnMnSe into InGaAs-based quantum structures*, Physica E **32**, 434 (2006)
- [A2.3:3] *† E. Tsitsishvili, H. Kalt, and R. v. Baltz, *Exciton-spin relaxation in weakly confining quantum dots due to spin-orbit interaction*, phys. stat. sol. (b) **243**, 2274 (2006)
- [A2.3:4] *† W. Löffler, D. Tröndle, J. Fallert, E. Tsitsishvili, H. Kalt, D. Litvinov, D. Gerthsen, J. Lupaca-Schomber, T. Passow, B. Daniel, J. Kvietkova, and M. Hetterich, *Electrical spin injection into InGaAs quantum dots*, phys. stat. sol. (c) **3**, 2406 (2006)
- [A2.3:5] * T. Passow, S. Li, D. Litvinov, W. Löffler, J. Fallert, B. Daniel, J. Lupaca-Schomber, J. Kvietkova, D. Gerthsen, H. Kalt, and M. Hetterich, *Investigation of InAs quantum dot growth for electrical spin injection devices*, phys. stat. sol. (c) **3**, 3943 (2006)
- [A2.3:6] *† E. Tsitsishvili and H. Kalt, *Magnetic field effects on spin-flip processes in semimagnetic quantum wells*, Phys. Rev. B **73**, 195402 (2006)
- [A2.3:7] * M. Hetterich, W. Löffler, J. Fallert, N. Höpcke, H. Burger, T. Passow, S. Li, B. Daniel, B. Ramadout, J. Lupaca-Schomber, J. Hetterich, D. Litvinov, D. Gerthsen, C. Klingshirn, and H. Kalt, *Electrical spin injection into InGa(N)As quantum structures and single InGaAs quantum dots*, phys. stat. sol. (b) **243**, 3812 (2006) (invited paper)
- [A2.3:8] J. Schörmann, D.J. As, K. Lischka, P. Schley, R. Goldhahn, S.F. Li, W. Löffler, M. Hetterich, and H. Kalt, *Molecular beam epitaxy of phase pure cubic InN*, Appl. Phys. Lett. **89**, 261903 (2006)
- [A2.3:9] A. Grau, T. Passow, and M. Hetterich, *Temperature dependence of the GaAsN conduction band structure*, Appl. Phys. Lett. **89**, 202105 (2006)
- [A2.3:10] * D. Litvinov, D. Gerthsen, A. Rosenauer, M. Schowalter, T. Passow, P. Feinäugle, and M. Hetterich, *Transmission electron microscopy investigation of segregation and critical floating-layer content of indium for island formation in $In_xGa_{1-x}As$* , Phys. Rev. B **74**, 165306 (2006)
- [A2.3:11] * D. Litvinov, D. Gerthsen, B. Daniel, C. Klingshirn, and M. Hetterich, *Defects and phase distribution in epitaxial ZnMnSe layers analyzed by transmission electron microscopy*, J. Appl. Phys. **100**, 023523 (2006)
- [A2.3:12] * K.C. Agarwal, B. Daniel, C. Klingshirn, and M. Hetterich, *Phonon and free-charge-carrier properties of $Zn_{1-x}Mn_xSe$ epilayers grown by molecular-beam epitaxy*, Phys. Rev. B **73**, 045211 (2006)
- [A2.3:13] *† T. Hofmann, U. Schade, K.C. Agarwal, B. Daniel, C. Klingshirn, M. Hetterich, C.M. Herzinger, and M. Schubert, *Conduction-band electron effective mass in $Zn_{0.87}Mn_{0.13}Se$ measured by terahertz and far-infrared magneto-optic ellipsometry*, Appl. Phys. Lett. **88**, 042105 (2006)
- [A2.3:14] *† K.C. Agarwal, B. Daniel, T. Hofmann, M. Schubert, C. Klingshirn, and M. Hetterich, *Phonon properties and doping of $Zn_{1-x}Mn_xSe$ epilayers grown by molecular-beam epitaxy*, phys. stat. sol. (b) **243**, 914 (2006)

- [A2.3:15] * D. Litvinov, D. Gerthsen, A. Rosenauer, T. Passow, M. Grün, C. Klingshirn, and M. Hetterich, *In distribution in InGaAs quantum wells and quantum islands*, Microscopy of Semiconducting Materials, Proc. 14th conference (MSM XIV), Oxford, UK, 2005, Springer Proceedings in Physics, Vol. **107**, pp. 275–278, Eds.: A.G. Cullis and J.L. Hutchison (2006)
- [A2.3:16] * M. Hetterich, W. Löffler, J. Fallert, T. Passow, B. Daniel, J. Lupaca-Schomber, J. Hetterich, S. Li, C. Klingshirn, and H. Kalt, *Electrical spin injection into InGaAs quantum dot ensembles and single quantum dots*, AIP Conf. Proc. **893**, 1285 (2007)
- [A2.3:17] A.N. Reznitsky, A.A. Klochikhin., S.A. Permogorov, L.N. Tenishev, E. Tsitsishvili, R. v. Baltz, H. Kalt, and C.F. Klingshirn, *Temperature dependence of exciton spin relaxation rates in semiconductor quantum dots*, AIP Conf. Proc. **893**, 1321 (2007)
- [A2.3:18] * W. Löffler, N. Höpcke, C. Mauser, J. Fallert, T. Passow, B. Daniel, S. Li, D. Litvinov, D. Gerthsen, H. Kalt, and M. Hetterich, *Spin and carrier relaxation dynamics in InAs/GaAs quantum-dot spin-LEDs*, J. Physics: Conf. Ser. **61**, 745 (2007)
- [A2.3:19] * ‡ A. Reznitsky, S. Permogorov, A. Klochikhin, H. Kalt, and C. Klingshirn, *Optical spectroscopy of 2D nanoislands in quantum wells: lateral island profiles and nature of emitting states*, Int. J. Nanoscience **6**, 305 (2007) (invited paper)
- [A2.3:20] W. Löffler, M. Hetterich, C. Mauser, S. Li, T. Passow, and H. Kalt, *Parallel preparation of highly spin-polarized electrons in single InAs/GaAs quantum dots*, Appl. Phys. Lett. **90**, 232105 (2007)
- [A2.3:21] * ‡ M.M. Glazov, E.L. Ivchenko, R. v. Baltz, and E. Tsitsishvili, *Fine structure of excited excitonic states in quantum disks*, Int. J. Nanoscience **6**, 265 (2007)
- [A2.3:22] * T. Passow, S. Li, P. Feinäugle, T. Vallaitis, J. Leuthold, D. Litvinov, D. Gerthsen, and M. Hetterich, *Systematic investigation into the influence of growth conditions on InAs/GaAs quantum dot properties*, J. Appl. Phys. **102**, 073511 (2007)
- [A2.3:23] * D. Litvinov, D. Gerthsen, A. Rosenauer, M. Schowalter, T. Passow, and M. Hetterich, *The role of segregation in InGaAs heteroepitaxy*, Mat. Sci. Forum **539–543**, 3540 (2007)
- [A2.3:24] ‡ E. Tsitsishvili and H. Kalt, *Spin-conserving scattering of holes by magnetic ions in semimagnetic quantum wells*, Phys. Rev. B **77**, 155305 (2008)
- [A2.3:25] * D. Litvinov, H. Blank, R. Schneider, D. Gerthsen, T. Vallaitis, J. Leuthold, T. Passow, A. Grau, H. Kalt, C. Klingshirn, and M. Hetterich, *Influence of InGaAs cap layers with different In concentration on the properties of InGaAs quantum dots*, J. Appl. Phys. **103**, 083532 (2008)
- [A2.3:26] * W. Löffler, M. Hetterich, C. Mauser, S. Li, J. Leuthold, and H. Kalt, *Spin-polarized excitonic emission from quantum dots after electrical injection*, phys. stat. sol. (b) **245**, 1102 (2008)
- [A2.3:27] *‡ A. Klochikhin, A. Reznitsky, S. Permogorov, E. Tsitsishvili, R. v. Baltz, H. Kalt, and C. Klingshirn, *Exciton states and spin relaxation in CdSe/ZnSe self organized quantum dots*, Semicond. Sci. Technol. **23**, 114010 (2008); selected by the editor for the 2008 SST annual highlights collection
- [A2.3:28] * D. Litvinov, M. Schowalter, A. Rosenauer, B. Daniel, J. Fallert, W. Löffler, H. Kalt, and M. Hetterich, *Determination of critical thickness for defect formation of CdSe/ZnSe heterostructures by transmission electron microscopy and photoluminescence spectroscopy*, phys. stat. sol. (a) **205**, 2892 (2008)

- [A2.3:29] * ‡ K.C. Agarwal, B. Daniel, C. Klingshirn, M. Hetterich, H. Saito, S. Yuasa, K. Ando, *Magneto-optical studies on magnetic semiconductors*, AIP Conf. Proc. **1003**, 225 (2008)
- [A2.3:30] ‡ M.F. Saenger, M. Hetterich, T. Hofmann, R.D. Kirby, D.J. Sellmyer, and M. Schubert, *Dielectric and magnetic birefringence in low-chlorine-doped n-type Zn_{1-x}Mn_xSe*, phys. stat. sol. (c) **5**, 1007 (2008)
- [A2.3:31] * M. Hetterich, W. Löffler, P. Aßhoff, H. Flügge, J. Müller, B. Westenfelder, D.Z. Hu, D.M. Schaad, and H. Kalt, *Electrical spin injection into InGaAs quantum dots: single dot devices and time-resolved studies*, phys. stat. sol. (c) **6**, 432 (2009)
- [A2.3:32] P. Asshoff, W. Löffler, J. Zimmer, H. Füser, H. Flügge, H. Kalt, and M. Hetterich, *Spin-polarization dynamics in InGaAs quantum dots during pulsed electrical spin-injection*, Appl. Phys. Lett. **95**, 202105 (2009)
- [A2.3:33] * P. Asshoff, W. Löffler, H. Flügge, J. Zimmer, J. Müller, B. Westenfelder, D.Z. Hu, D.M. Schaad, H. Kalt, and M. Hetterich, *Pulsed electrical spin injection into InGaAs quantum dots: studies of the electroluminescence polarization dynamics*, AIP Conf. Proc. **1199**, 383 (2009)
- [A2.3:34] * D. Gerthsen, H. Blank, D. Litvinov, R. Schneider, A. Rosenauer, T. Passow, A. Grau, P. Feinäugle, H. Kalt, C. Klingshirn, and M. Hetterich, *On the incorporation of indium in InAs-based quantum structures*, J. Physics: Conf. Ser. **209**, 012006 (2010)
- [A2.3:35] P. Asshoff, M. Hetterich, J. Zimmer, H. Füser, W. Löffler, and H. Kalt, *Spin-polarization dynamics in electrically excited single InGaAs quantum dots*, J. Physics: Conf. Ser. **200**, 062002 (2010)
- [A2.3:36] * N. Joshi, C. Sürgers, H. v. Löhneysen, W. Löffler, and H. Kalt, *Effect of magnetic flux penetration on the magnetic hysteresis loops of a Pt/Co/Pt triple layer on Nb(110)*, J. Physics: Conf. Ser. **200**, 072096 (2010)
- [A2.3:37] W. Löffler, N. Höpcke, H. Kalt, S.F. Li, M. Grün, and M. Hetterich, *Doping and optimal electron spin polarization in n-ZnMnSe for quantum-dot spin-injection light-emitting diodes*, Appl. Phys. Lett. **96**, 052113 (2010)
- [A2.3:38] E. Tsitsishvili and H. Kalt, *Exciton spin relaxation in strongly confining semiconductor quantum dots*, Phys. Rev. B **82**, 195315 (2010)
- [A2.3:39] M. Hetterich, P. Asshoff, G. Wüst, A. Merz, and H. Kalt, *Nuclear spin-polarization in single InGaAs quantum dots through electrical and optical spin-injection in spin-LEDs*, phys. stat. sol. (c) **8**, 1157 (2011)
- [A2.3:40] P. Asshoff, A. Merz, H. Kalt, and M. Hetterich, *A spintronic source of circularly polarized single photons*, Appl. Phys. Lett. **98**, 112106 (2011)
- [A2.3:41] *‡ 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. Schaad, *Growth and annealing of InAs quantum dots on pre-structured GaAs substrates*, J. Crystal Growth **323**, 187 (2011)
- [A2.3:42] * P. Asshoff, G. Wüst, A. Merz, D. Litvinov, D. Gerthsen, H. Kalt, and M. Hetterich, *Nuclear spin-polarization in single self-assembled In_{0.3}Ga_{0.7}As quantum dots by electrical spin injection*, Phys. Rev. B **84**, 125302 (2011)
- [A2.3:43] *‡ K. Müller, M. Schowalter, A. Rosenauer, D. Hu, D.M. Schaad, M. Hetterich, P. Gilet, O. Rubel, R. Fritz, and K. Volz, *Atomic scale annealing effects on In_xGa_{1-x}N_yAs_{1-y} studied by TEM three-beam imaging*, Phys. Rev. B **84**, 045316 (2011)

[A2.3:44] *‡ K. Müller, M. Schowalter, O. Rubel, D.Z. Hu, D.M. Schaadt, M. Hetterich, P. Gilet, R. Fritz, K. Volz, and A. Rosenauer, *TEM 3-beam study of annealing effects in InGaNAs using ab-initio structure factors for strain-relaxed supercells*, J. Physics: Conf. Ser. **326**, 012026 (2011)

A2.5 ‘Structural and Chemical Properties of Quantum Dot Structures’ (D. Gerthsen, D. Litvinov)

- [A2.5:1] * W. Löffler, D. Tröndle, J. Fallert, H. Kalt, D. Litvinov, D. Gerthsen, J. Lupaca-Schomber, T. Passow, B. Daniel, J. Kvietkova, M. Grün, C. Klingshirn, and M. Hetterich, *Electrical spin injection from ZnMnSe into InGaAs quantum wells and quantum dots*, Appl. Phys. Lett. **88**, 062105 (2006)
- [A2.5:2] * D. Litvinov, D. Gerthsen, A. Rosenauer, M. Schowalter, T. Passow, and M. Hetterich, *Transmission electron microscopy investigation of segregation and critical floating-layer content of indium for island formation in InGaAs*, Phys. Rev. B **74**, 165306 (2006)
- [A2.5:3] * Litvinov, D. Gerthsen, B. Daniel, M. Hetterich, and C. Klingshirn, *Defects and phase distribution in epitaxial ZnMnSe layers analyzed by transmission electron microscopy*, J. Appl. Phys. **100**, 023523 (2006)
- [A2.5:4] M. Schowalter, A. Rosenauer, and D. Gerthsen, *On the influence of surface segregation on the optical properties of semiconductor quantum wells*, Appl. Phys. Lett. **88**, 111906 (2006)
- [A2.5:5] * W. Löffler, D. Tröndle, H. Kalt, D. Litvinov, D. Gerthsen, J. Lupaca-Schomber, T. Passow, B. Daniel, J. Kvietkova, and M. Hetterich, *Electrical spin injection from ZnMnSe into InGaAs-based quantum structures*, Physica E **32**, 434 (2006)
- [A2.5:6] * W. Löffler, D. Tröndle, J. Fallert, E. Tsitsishvili, H. Kalt, D. Litvinov, D. Gerthsen, J. Lupaca-Schomber, T. Passow, B. Daniel, J. Kvietkova, and M. Hetterich, *Electrical spin injection into InGaAs quantum dots*, phys. stat. sol. (c) **3**, 2406 (2006)
- [A2.5:7] M. Schowalter, A. Rosenauer, D. Litvinov, and D. Gerthsen, *Investigation of segregation by quantitative transmission electron microscopy*, Optica Applicata **36**, 297 (2006)
- [A2.5:8] Ch. Arens, N. Rousseau, D. Schikora, K. Lischka, O. Schöps, E. Herz, U. Woggon, D. Litvinov, D. Gerthsen, and M.V. Artemyev, *Colloidal nanocrystals integrated in epitaxial nanostructures: structural and optical properties*, phys. stat. sol. (c) **3**, 861 (2006)
- [A2.5:9] * T. Passow, S. Li, D. Litvinov, J. Fallert, W. Löffler, B. Daniel, J. Lupaca-Schomber, J. Kvietkova, D. Gerthsen, H. Kalt, and M. Hetterich, *Investigation of InAs quantum dot growth for electrical spin injection devices*, phys. stat. sol. (c) **3**, 3943 (2006)
- [A2.5:10] S. Sadofev, S. Blumstengel, J. Cui, J. Puls, F. Henneberger, R. Schneider, D. Litvinov, and D. Gerthsen, *Uniform and Efficient UV-emitting ZnO/ZnMgO Multiple Quantum Wells Grown by Radical-Source Molecular Beam Epitaxy*, Jpn. J. Appl. Phys. **45**, L1250 (2006)
- [A2.5:11] * D. Litvinov, D. Gerthsen, A. Rosenauer, M. Schowalter, T. Passow, and M. Hetterich, *The role of segregation in InGaAs heteroepitaxy*, Mater. Sci. Forum **539-543**, 3540 (2007)
- [A2.5:12] * T. Passow, S. Li, P. Feinäugle, Th. Vallaitis, J. Leuthold, D. Litvinov, D. Gerthsen, and M. Hetterich, *Systematic investigation of the influence of growth conditions on InAs/GaAs quantum dot properties*, J. Appl. Phys. **102**, 073511 (2007)
- [A2.5:13] K. Volz, T. Torunski, O. Rubel, W. Stolz, P. Kruse, D. Gerthsen, M. Schowalter, and A. Rosenauer, *Annealing effects on the nanoscale indium and nitrogen distribution in Ga(NAs) and (GaIn)(NAs) quantum wells*, J. Appl. Phys. **102**, 083504 (2007)

- [A2.5:14] N.N. Ledentsov, D. Bimberg, F. Hopfer, A. Mutig, V. A. Shchukin, A. V. Savel'ev, G. Fiol, E. Stock, H. Eisele, M. Dähne, D. Gerthsen, U. Fischer, D. Litvinov, A. Rosenauer, S.S. Mikhrin, A.R. Kovsh, N.D. Zakharov, and P. Werner, *Submonolayer Quantum Dots for High Speed Surface Emitting Lasers*, Nanoscale Res. Lett. **2**, 417 (2007) (Nano Review)
- [A2.5:15] * D. Litvinov, H. Blank, R. Schneider, D. Gerthsen, T. Vallaitis, J. Leuthold, T. Passow, A. Grau, H. Kalt, C. Klingshirn, and M. Hetterich, *Influence of InGaAs cap layers with different In-concentration on the properties of InGaAs quantum dots*, J. Appl. Phys. **103**, 083532 (2008)
- [A2.5:16] * D. Litvinov, M. Schowalter, A. Rosenauer, B. Daniel, J. Fallert, W. Löffler, H. Kalt, and M. Hetterich, *Determination of critical thickness for defect formation of CdSe/ZnSe heterostructures by transmission electron microscopy and photoluminescence spectroscopy*, phys. stat. sol. (a) **205**, 2892 (2008)
- [A2.5:17] I.P. Soshnikov, G.E. Cirlin, N.V. Sibirev, V.G. Dubrovskii, Yu.B. Samsonenko, D. Litvinov, and D. Gerthsen, *Hexagonal structures in GaAs nanowhiskers*, Technical Physics Letters **34**, 538 (2008)
- [A2.5:18] * 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*, Optics Express **16**, 21512 (2008)
- [A2.5:19] T. Li, C. Simbrunner, A. Navarro-Quezada, M. Wegscheider, M. Quast, D. Litvinov, D. Gerthsen, A. Bonanni, *Phase-dependent distribution of Fe-rich nanocrystals in MOVPE-grown (Ga,Fe)N*, J. Cryst. Growth **310**, 3294 (2008)
- [A2.5:20] * M. Hetterich, W. Löffler, T. Passow, D. Litvinov, D. Gerthsen, and H. Kalt, *Electrical spin injection into single InGaAs quantum dots*, Advances in Solid State Physics **48**, 103 (2009)
- [A2.5:21] * 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 Communication **149**, 1485 (2009)
- [A2.5:22] * H. Blank, D. Litvinov, R. Schneider, D. Gerthsen, and K. Scheerschmidt, *Quantification of the In-distribution in embedded InGaAs quantum dots by transmission electron microscopy*, Cryst. Res. Technol. **44**, 1083 (2009)
- [A2.5:23] * J. Sweet, B.C. Richards, J.D. Oltizky, J. Hendrickson, G. Khitrova, H.M. Gibbs, D. Litvinov, D. Gerthsen, D.Z. Hu, D.M. Schaadt, M. Wegener, U. Khankhoje, and A. Scherer, *GaAs photonic crystal slab nanocavities: Growth, fabrication, and photon storage time*, Photonics and Nanostructures **8**, 1 (2010)
- [A2.5:24] * D. Gerthsen, H. Blank, D. Litvinov, R. Schneider, A. Rosenauer, T. Passow, A. Grau, P. Feinäugle, H. Kalt, C. Klingshirn, and M. Hetterich, *On the incorporation of indium in InAs-based quantum structures*, J. Physics: Conf. Ser. **209**, 012006 (2010)
- [A2.5:25] * 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, *Polarization conservation and dephasing in InAs quantum dot ensembles*, Proc. SPIE **7597**, 75971R (2010)
- [A2.5:26] * M. Helfrich, R. Gröger, A. Förste, D. Litvinov, D. Gerthsen, T. Schimmel, and D.M. Schaadt, *Investigation of pre-structured GaAs surface for subsequent site-selective InAs QD growth*, Nanoscale Res. Lett. **6**, 211 (2011)

- [A2.5:27] G. Kiliani, R. Schneider, D. Litvinov, D. Gerthsen, M. Fonin, U. Rüdiger, A. Leitenstorfer, and R. Bratschitsch, *Ultraviolet photoluminescence of ZnO quantum dots sputtered at room-temperature*, Opt. Express **19**, 1641 (2011)
- [A2.5:28] * Asshoff, G. Wüst, A. Merz, D. Litvinov, D. Gerthsen, H. Kalt, and M. Hetterich, *Nuclear spin-polarization in single self-assembled InGaAs quantum dots by electrical spin-injection*, Phys. Rev. B **84**, 125302 (2011)
- [A2.5:29] * D. Litvinov, D. Gerthsen, R. Vöhringer, D.Z. Hu, and D.M. Schaad, *Transmission electron microscopy investigation of AlN Growth on Si(111)*, J. Cryst. Growth, doi:10.1016/j.jcrysgro.2011.11.038
- [A2.5:30] * R. Walther, D. Litvinov, M. Fotouhi, R. Schneider, D. Gerthsen, R. Vöhringer, D.Z. Hu, and D.M. Schaad, *Microstructure of PAMBE-grown InN layers on Si(111)*, J. Cryst. Growth, doi:10.1016/j.jcrysgro.2011.11.068

A2.6 ‘Optimized Quantum Dots for Spin Devices and Optimized Resonators’ (D. Schaadt)

- [A2.6:1] ‡ I. Lo, C.H. Hsieh, Y.L. Chen, W.Y. Pang, Y.C. Hsu, J.C. Chiang, M.C. Chou, J.K. Tsai, and D.M. Schaadt, *Line defects of M-plane GaN grown on gamma-LiAlO₂ by plasma-assisted molecular beam epitaxy*, Appl. Phys. Lett. **92**, 202106 (2008)
- [A2.6:2] * M. Karl, T. Beck, S. Li, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *GaAs micro-pyramids serving as optical micro-cavities*, presented at 29th Int. Conf. on the Physics of Semiconductors, Rio de Janeiro, Brazil, 2008, paper in press
- [A2.6:3] * P. Aßhoff, W. Löffler, H. Flügge, J. Müller, B. Westenfelder, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *Electrical spin injection into InGaAs quantum dots: single dot devices and studies of the time-resolved electroluminescence polarization dynamics*, presented at 29th Int. Conf. on the Physics of Semiconductors, Rio de Janeiro, Brazil, 2008, paper in press
- [A2.6:4] * M. Karl, T. Beck, F.M. Weber, J. Lupaca-Schomber, S. Li, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *Optical cavity modes in micro-pyramids*, CLEO/QELS Conf. Proc. 1-9, 3120 (2008)
- [A2.6:5] U. Geyer, J. Hetterich, C. Diez, D.Z. Hu, D.M. Schaadt, and U. Lemmer, *Nano-structured metallic electrodes for plasmonic optimized light-emitting diodes*, Proc. SPIE 7032, 70320B (2008)
- [A2.6:6] * M. Hetterich, W. Löffler, P. Aßhoff, H. Flügge, J. Müller, B. Westenfelder, D.Z. Hu, D.M. Schaadt, and H. Kalt, *Electrical spin injection into InGaAs quantum dots: single dot devices and time-resolved studies*, phys. stat. sol. (c) **6**, 432 (2009)
- [A2.6:7] * P. Aßhoff, J. Zimmer, H. Fuser, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *Time-resolved studies of pulsed electrical spin injection into single InGaAs quantum dots*, CLEO/EQEC Conf. Proc., 5192133 (2009)
- [A2.6:8] * D. Rülke, M. Karl, T. Beck, D. Z. Hu, D. M. Schaadt, H. Kalt, and M. Hetterich, *Optical microcavities with pyramidal shape*, CLEO/EQEC Conf. Proc., 5196500 (2009)
- [A2.6:9] * ‡ J. Sweet, B. C. Richards, J. D. Olitzky, J. Hendrickson, G. Khitrova, H. M. Gibbs, D. Litvinov, D. Gerthsen, D.Z. Hu, D.M. Schaadt, M. Wegener, U. Khankhoje, and A. Scherer, *GaAs photonic crystal slab nanocavities: growth, fabrication, and quality factor*, Photonics and Nanostructures **8**, 1 (2010)
- [A2.6:10] * M. Karl, D. Rülke, T. Beck, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *Reversed pyramids as novel optical micro-cavities*, Superlattices and Microstruct. **47**, 83 (2010)
- [A2.6:11] * M. Karl, T. Beck, S. Li, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *GaAs micro-pyramids serving as optical micro-cavities*, AIP Conf. Proc. **1199**, 369 (2009)
- [A2.6:12] * P. Aßhoff, W. Löffler, H. Flügge, J. Zimmer, J. Müller, B. Westenfelder, D. Z. Hu, D. M. Schaadt, H. Kalt, and M. Hetterich, *Pulsed Electrical Spin Injection into InGaAs Quantum Dots: Studies of the Electroluminescence Polarization Dynamics*, AIP Conf. Proc. **1199**, 383 (2009)
- [A2.6:13] M. Riotte, E. Fohtung, D. Grigoriev, A.A. Minkevich, T. Slobodskyy, M. Schmidbauer, T.H. Metzger, D.Z. Hu, D.M. Schaadt, and T. Baumbach, *Lateral ordering, strain and morphology evolution of InGaAs/GaAs(001) Quantum Dots (QDs) due to high temperature post growth annealing*, Appl. Phys. Lett. **96**, 083102 (2010)

- [A2.6:14] * T. Volkenandt, E. Müller, D.Z. Hu, D.M. Schaad, and D. Gerthsen, *Quantification of Sample Thickness and In-Concentration of InGaAs Quantum Wells by Transmission Measurements in a Scanning Electron Microscope*, *Micros. Microanal.* **16**, 604 (2010)
- [A2.6:15] * ‡ J. Hendrickson, M. Helfrich, M. Gehl, D.Z. Hu, D. Schaad, 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)
- [A2.6:16] * M. Helfrich, R. Gröger, A. Förste, D. Litvinov, D. Gerthsen, T. Schimmel, and D. M. Schaad, *Investigation of pre-structured GaAs surface for subsequent site-selective InAs QD growth*, *Nanoscale Res. Lett.* **6**, 211 (2011)
- [A2.6:17] * ‡ 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. Schaad, *Growth and annealing of InAs quantum dots on pre-structured GaAs substrates*, *J. Cryst. Growth* **323**, 187 (2011)
- [A2.6:18] * D. Rülke, M. Karl, D. Z. Hu, D. M. Schaad, H. Kalt, and M. Hetterich, *Optical microcavities fabricated by DBR overgrowth of pyramidal-shaped GaAs mesas*, *J. Cryst. Growth* **324**, 259 (2011)
- [A2.6:19] * ‡ K. Müller, M. Schowalter, A. Rosenauer, D.Z. Hu, D.M. Schaad, M. Hetterich, P. Gilet, O. Rubel, R. Fritz, and K. Volz, *Atomic scale annealing effects on $In_xGa_{1-x}N_yAs_{1-y}$ studied by TEM three-beam imaging*, *Phys. Rev. B* **84**, 045316 (2011)

A2.7 'Growth of Nitride Spin Devices' (D. Schaad)

- [A2.7:1] * P.R. Ganz, C. Sürgers, G. Fischer, and D.M. Schaad, *Cu-doped GaN grown by molecular beam epitaxy*, J. Phys. Conf. Series **200**, 062006 (2010)
- [A2.7:2] *‡ R. Schuber, M.M.C. Chou, P. Vincze, Th. Schimmel, and D.M. Schaad, *Growth of A-plane GaN growth on LiGaO₂(010) by plasma-assisted molecular beam epitaxy*, J. Crystal Growth **312**, 1665 (2010)
- [A2.7:3] ‡ R. Schuber, M.M.C. Chou, and D.M. Schaad, *Growth of M-plane GaN on LiGaO₂(100) by plasma-assisted molecular beam epitaxy*, Thin Solid Films **518**, 6773 (2010)
- [A2.7:4] * P.R. Ganz, G. Fischer, C. Sürgers, and D.M. Schaad, *Cu-doped nitrides: promising candidates for a nitride based spinaligner*, J. Crystal Growth **323**, 355 (2011)
- [A2.7:5] *‡ R. Schuber, Y.L. Chen, C.H. Shih, T.H. Huang, P. Vincze, I. Lo, L.W. Chang, Th. Schimmel, M.M.C. Chou, and D.M. Schaad, *Growth of non-polar GaN on LiGaO₂ by plasma-assisted MBE*, J. Crystal Growth **323**, 76 (2011)
- [A2.7:6] *‡ T.-H. Huang, P.R. Ganz, L. Chang, and D.M. Schaad, *Formation Mechanisms of Islands on Cu-Alloyed GaN Grown by Plasma Assisted Molecular Beam Epitaxy*, J. Electrochem. Soc. **158**, H860 (2011)
- [A2.7:7] *‡ C.-H. Shih, T.-H. Huang, R. Schuber, Y.-L. Chen, L. Chang, I. Lo, M.M.C. Chou, and D.M. Schaad, *Microstructure of non-polar GaN on LiGaO₂ grown by plasma-assisted MBE*, Nanoscale Res. Lett. **6**, 425 (2011)

A2.8 ‘Optical Microcavities’ (H. Kalt, M. Hetterich)

- [A2.8:1] * D. Litvinov, D. Gerthsen, A. Rosenauer, M. Schowalter, T. Passow, P. Feinäugle, and M. Hetterich, *Transmission electron microscopy investigation of segregation and critical floating-layer content of indium for island formation in $In_xGa_{1-x}As$* , Phys. Rev. B **74**, 165306 (2006)
- [A2.8:2] * D. Litvinov, D. Gerthsen, A. Rosenauer, T. Passow, M. Grün, C. Klingshirn, and M. Hetterich, *In distribution in $InGaAs$ quantum wells and quantum islands*, Microscopy of Semiconducting Materials, Proc. 14th conference (MSM XIV), Oxford, UK, 2005, Springer Proceedings in Physics **107**, 275, Eds.: A.G. Cullis, J.L. Hutchison (2006)
- [A2.8:3] * J. Brückner, J. Silbereisen, D. Daub, U. Geyer, G. Bastian, B. Daniel, and M. Hetterich, *Optical and acoustical ridge waveguides based on piezoelectric semiconductors for novel integrated acoustooptic components*, Proc. Photonics Europe 2006, Integrated Optics, Silicon Photonics, and Photonic Integrated Circuits, G.C. Righini (Ed.), Proc. SPIE **6183**, 618309 (2006)
- [A2.8:4] * T. Passow, S. Li, D. Litvinov, W. Löffler, J. Fallert, B. Daniel, J. Lupaca-Schomber, J. Kvietková, D. Gerthsen, H. Kalt, and M. Hetterich, *Investigation of $InAs$ quantum dot growth for electrical spin injection devices*, 4th Int. Conf. on Quantum Dots (QD2006), Chamonix-Mont Blanc, France, phys. stat. sol. (c) **3**, 3943 (2006)
- [A2.8:5] * F.M. Weber, M. Karl, J. Lupaca-Schomber, W. Löffler, S. Li, T. Passow, J. Hawecker, D. Gerthsen, H. Kalt, and M. Hetterich, *Optical modes in pyramidal $GaAs$ microcavities*, Appl. Phys. Lett. **90**, 161104 (2007); featured in: Nature Photonics **1**, 317 (2007), News & Views
- [A2.8:6] * T. Passow, S. Li, P. Feinäugle, T. Vallaitis, J. Leuthold, D. Litvinov, D. Gerthsen, and M. Hetterich, *Systematic investigation into the influence of growth conditions on $InAs/GaAs$ quantum dot properties*, J. Appl. Phys. **102**, 073511 (2007)
- [A2.8:7] * M. Karl, S. Li, T. Passow, W. Löffler, H. Kalt, and M. Hetterich, *Localized and delocalized modes in coupled optical micropillar cavities*, Optics Express **15**, 8191 (2007)
- [A2.8:8] * D. Litvinov, D. Gerthsen, A. Rosenauer, M. Schowalter, T. Passow, and M. Hetterich, *The role of segregation in $InGaAs$ heteroepitaxy*, THERMEC' 2006 (Int. Conf. on Processing & Manufacturing of Advanced Materials), Vancouver, Canada, 2006, Mat. Sci. Forum **539–543**, 3540 (2007)
- [A2.8:9] * M. Karl, W. Löffler, J. Lupaca-Schomber, T. Passow, S. Li, J. Hawecker, F. Pérez-Willard, D. Gerthsen, H. Kalt, C. Klingshirn, and M. Hetterich, *Single and coupled microcavities – $AlAs/GaAs$ DBR pillars and $GaAs$ pyramids*, Proc. 28th Int. Conf. on the Physics of Semiconductors, Vienna, Austria, 2006, AIP Conf. Proc. **893**, 1133 (2007)
- [A2.8:10] * M. Karl, T. Beck, S. Li, H. Kalt, and M. Hetterich, *Q-factor and density of optical modes in pyramidal and cone-shaped $GaAs$ microcavities*, Appl. Phys. Lett. **92**, 231105 (2008)
- [A2.8:11] * D. Litvinov, H. Blank, R. Schneider, D. Gerthsen, T. Vallaitis, J. Leuthold, T. Passow, A. Grau, H. Kalt, C. Klingshirn, and M. Hetterich, *Influence of $InGaAs$ cap layers with different In concentration on the properties of $InGaAs$ quantum dots*, J. Appl. Phys. **103**, 083532 (2008)
- [A2.8:12] * M. Karl, F.M. Weber, J. Lupaca-Schomber, S. Li, T. Passow, W. Löffler, H. Kalt, and M. Hetterich, *GaAs pyramids on GaAs/AlAs Bragg reflectors as alternative microcavities*, 7th Int. Conf. on the Physics of Light-Matter Coupling in

Nanostructures (PLMCN7), Havana, Cuba, 2007, Superlattices and Microstructures **43**, 635 (2008)

- [A2.8:13] * D. Litvinov, M. Schowalter, A. Rosenauer, B. Daniel, J. Fallert, W. Löffler, H. Kalt, and M. Hetterich, *Determination of critical thickness for defect formation of CdSe / ZnSe heterostructures by transmission electron microscopy and photoluminescence spectroscopy*, phys. stat. sol. (a) **205**, 2892 (2008)
- [A2.8:14] ‡ M.F. Saenger, M. Hetterich, T. Hofmann, R.D. Kirby, D.J. Sellmyer, and M. Schubert, *Dielectric and magnetic birefringence in low-chlorine-doped n-type Zn_{1-x}Mn_xSe*, 4th Int. Conf. on Spectroscopic Ellipsometry (ICSE 4), Stockholm, Sweden, 2007, phys. stat. sol. (c) **5**, 1007 (2008)
- [A2.8:15] * M. Karl, B. Kettner, S. Burger, F. Schmidt, H. Kalt, and M. Hetterich, *Dependencies of micro-pillar cavity quality factors calculated with finite element methods*, Optics Express **17**, 1144 (2009)
- [A2.8:16] * M. Karl, D. Rülke, T. Beck, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *Reversed pyramids as novel optical micro-cavities*, 9th Int. Conf. on the Physics of Light-Matter Coupling in Nanostructures (PLMCN9), Lecce, Italy, 2009, Superlattices and Microstructures **47**, 83 (2010)
- [A2.8:17] * M. Karl, T. Beck, S. Li, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *GaAs micro-pyramids serving as optical micro-cavities*, 29th Int. Conf. on the Physics of Semiconductors (ICPS), Rio de Janeiro, Brazil, 2008, AIP Conf. Proc. **1199**, 369 (2010)
- [A2.8:18] * D. Gerthsen, H. Blank, D. Litvinov, R. Schneider, A. Rosenauer, T. Passow, A. Grau, P. Feinäugle, H. Kalt, C. Klingshirn, and M. Hetterich, *On the incorporation of indium in InAs-based quantum structures*, Microscopy of Semiconducting Materials (MSM XVI), Oxford, UK, 2009, Journal of Physics: Conference Series **209**, 012006 (2010)
- [A2.8:19] *‡ K. Müller, M. Schowalter, A. Rosenauer, D. Hu, D.M. Schaadt, M. Hetterich, P. Gilet, O. Rubel, R. Fritz, and K. Volz, *Atomic scale annealing effects on In_xGa_{1-x}N_yAs_{1-y} studied by TEM three-beam imaging*, Phys. Rev. B **84**, 045316 (2011)
- [A2.8:20] *‡ 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)
- [A2.8:21] * D. Rülke, M. Karl, D.Z. Hu, D.M. Schaadt, H. Kalt, and M. Hetterich, *Optical microcavities fabricated by DBR overgrowth of pyramidal-shaped GaAs mesas*, J. Crystal Growth **324**, 259 (2011)
- [A2.8:22] *‡ K. Müller, M. Schowalter, O. Rubel, D.Z. Hu, D.M. Schaadt, M. Hetterich, P. Gilet, R. Fritz, K. Volz, and A. Rosenauer, *TEM 3-beam study of annealing effects in InGaNAs using ab-initio structure factors for strain-relaxed supercells*, Journal of Physics: Conference Series **326**, 012026 (2011)

Project A4 ‘Nano-Photonic Devices’

A4.2 ‘Nanostructured Organic Photodiodes’ (U. Lemmer / H.-J. Eisler)

- [A4.2:1] J. Hetterich, G. Bastian, N.A. Gippius, S.G. Tikhodeev, G. von Plessen, and U. Lemmer, *Optimized design of plasmonic MSM photodetector*, IEEE J. Quantum Electron. **43**, 855 (2007)
- [A4.2:2] M. Punke, S. Valouch, S.W. Kettlitz, N. Christ, C. Gärtner, M. Gerken, and U. Lemmer, *Dynamic characterization of organic bulk heterojunction photodetectors*, Appl. Phys. Lett. **91**, 071118 (2007)
- [A4.2:3] S. Peters, Y. Sui, F. Glöckler, U. Lemmer, and M. Gerken, *Organic photodetectors for an integrated thin-film spectrometer*, Proc. SPIE **6765**, 676503 (2007)
- [A4.2:4] M. Punke, S. Valouch, S.W. Kettlitz, M. Gerken, and U. Lemmer, *Optical data link employing organic light-emitting diodes and organic photodiodes as optoelectronic components*, J. Lightwave Technol. **26**, 816 (2008)
- [A4.2:5] T. Rauch, M. Böberl, S.F. Tedde, J. Fürst, M.V. Kovalenko, G. Hesser, U. Lemmer, W. Heiss, and O. Hayden, *Near-Infrared Imaging with Quantum-Dot-Sensitized Organic Photodiodes*, Nature Photonics **3**, 332 (2009)
- [A4.2:6] N.S. Christ, S.W. Kettlitz, S. Valouch, S. Züfle, C. Gärtner, M. Punke, and U. Lemmer, *Nanosecond response of organic solar cells and photodetectors*, J. Appl. Phys. **105**, 104513 (2009)
- [A4.2:7] * M.D. Wissert, A. Schell, K.S. Ilin, M. Siegel, and H.-J. Eisler, *Nanoengineering and Characterization of Gold Dipole Nanoantennas with Enhanced Integrated Scattering Properties*, Nanotechnology **20**, 425203 (2009)
- [A4.2:8] S. Valouch, C.M. Ögün, S.W. Kettlitz, S. Züfle, N. Christ, and U. Lemmer, *Printed circuit board encapsulation and integration of high-speed polymer photodiodes*, Sensor Lett. **8**, 392 (2010)
- [A4.2:9] S. Züfle, N. Christ, S.W. Kettlitz, S. Valouch, and U. Lemmer, *Influence of temperature-dependent mobilities on the nanosecond response of organic solar cells and photodetectors*, Appl. Phys. Lett. **97**, 063306 (2010)
- [A4.2:10] * M.D. Wissert, K.S. Ilin, M. Siegel, U. Lemmer, and H.-J. Eisler, *Highly localized non-linear optical white-light response at nanorod ends from non-resonant excitation*, Nanoscale **2**, 1018 (2010)
- [A4.2:11] S.W. Kettlitz, S. Valouch, and U. Lemmer, *Organic solar cell degradation probed by the nanosecond photoresponse*, Appl. Phys. A **99**, 805 (2010)
- [A4.2:12] * M.D. Wissert, K.S. Ilin, M. Siegel, U. Lemmer, and H.J. Eisler *Coupled nanoantenna plasmon resonance spectra from two-photon laser excitation*, Nano Lett. **10**, 4161 (2010)
- [A4.2:13] N. Christ, S.W. Kettlitz, S. Züfle, S. Valouch, and U. Lemmer, *Nanosecond response of organic solar cells and photodiodes: Role of trap states*, Phys. Rev. B **83**, 195211 (2011)
- [A4.2:14] M.D. Wissert, B. Rudat, U. Lemmer, and H.-J. Eisler, *Quantum Dots as single-photon sources: Antibunching via two-photon excitation*, Phys. Rev. B **83**, 113304 (2011)
- [A4.2:15] * M.D. Wissert, C. Moosmann, K.S. Ilin, M. Siegel, U. Lemmer, and H.-J. Eisler, *Gold nanoantenna resonance diagnostics via transversal particle plasmon luminescence*, Opt. Expr. **19**, 3686 (2011)
- [A4.2:16] ‡ S. Pichler, T. Rauch, R. Seyrkammer, M. Böberl, S.F. Tedde, J. Fürst, M.V. Kovalenko, U. Lemmer, O. Hayden, and W. Heiss, *Temperature dependent*

photoresponse from colloidal PbS quantum dot sensitized inorganic/organic hybrid photodiodes, Appl. Phys. Lett. **98**, 053304 (2011)

A4.4 ‘Active and Passive Nanowire Waveguides for Optical Signal Processing’ (J. Leuthold, W. Freude)

- [A4.4:1] C. Koos, M. Fujii, C.G. Poulton, R. Steingrueber, J. Leuthold, and W. Freude, *FDTD-Modelling of Dispersive Nonlinear Ring Resonators: Accuracy Studies and Experiments*, IEEE J. Quantum Elect. **42**, 1215 (2006)
- [A4.4:2] * C.G. Poulton, C. Koos, M. Fujii, A. Pfrang, Th. Schimmel, J. Leuthold, and W. Freude, *Radiation modes and roughness loss in high index-contrast waveguides*, IEEE J. Sel. Top. Quant. Electron. **12**, 1306 (2006)
- [A4.4:3] M. Fujii, A. Maitra, C. Poulton, J. Leuthold, and W. Freude, *Non-reciprocal transmission and Schmitt trigger operation in strongly modulated asymmetric WBGs*, Opt. Express **14**, 12782 (2006)
- [A4.4:4] M. Fujii, C. Koos, C. Poulton, I. Sakagami, J. Leuthold, and W. Freude, *A simple and rigorous verification technique for nonlinear FDTD algorithm by optical parametric four-wave mixing*, Microwave and Optical Technol. Lett. **48**, 88 (2006)
- [A4.4:5] M. Fujii, C. Koos, C. Poulton, J. Leuthold, and W. Freude, *Nonlinear FDTD analysis and experimental validation of four-wave mixing in InGaAsP/InP racetrack micro-resonators*, IEEE Photon. Technol. Lett. **18**, 361 (2006)
- [A4.4:6] * T. Passow, S. Li, P. Feinäugle, T. Vallaitis, J. Leuthold, D. Litvinov, D. Gerthsen, and M. Hetterich, *Systematic investigation into the influence of growth conditions on InAs/GaAs quantum dot properties*, J. Appl. Phys. **102**, 073511 (2007)
- [A4.4:7] * D. Litvinov, H. Blank, R. Schneider, D. Gerthsen, T. Vallaitis, J. Leuthold, T. Passow, A. Grau, H. Kalt, C. Klingshirn, M. Hetterich, *Influence of InGaAs cap layers with different In concentration on the properties of InGaAs quantum dots*, J. Appl. Phys. **103**, 083532 (2008)
- [A4.4:8] C. Koos, L. Jacome, C. Poulton, J. Leuthold, and W. Freude, *Nonlinear silicon-on-insulator waveguides for all-optical signal processing*, Opt. Express **15**, 5976 (2007)
- [A4.4:9] C. Koos, C.G. Poulton, L. Zimmermann, L. Jacome, J. Leuthold, and W. Freude, *Ideal bend contour trajectories for single-mode operation of low-loss overmoded waveguides*, IEEE Photon. Technol. Lett. **19**, 819 (2007)
- [A4.4:10] C. Meuer, J. Kim, M. Laemmlin, S. Liebich, D. Bimberg, A. Capua, G. Eisenstein, R. Bonk, T. Vallaitis, J. Leuthold, A.R. Kovsh, and I.L. Krestnikov, *40 GHz small-signal cross-gain modulation in 1.3 μm quantum dot semiconductor optical amplifier*, Appl. Phys. Lett. **93**, 051110 (2008)
- [A4.4:11] T. Vallaitis, C. Koos, R. Bonk, W. Freude, M. Laemmlin, C. Meuer, D. Bimberg, and J. Leuthold, *Slow and fast dynamics of gain and phase in a quantum dot semiconductor optical amplifier*, Opt. Express **16**, 170 (2008)
- [A4.4:12] J.-M. Brosi, C. Koos, L.C. Andreani, M. Waldow, J. Leuthold, and W. Freude, *High-speed low-voltage electro-optic modulator with a polymer-infiltrated silicon photonic crystal waveguide*, Opt. Express **16**, 4177 (2008)
- [A4.4:13] J. Leuthold, W. Freude, J.-M. Brosi, R. Baets, P. Dumon, I. Biaggio, M.L. Scimeca, F. Diederich, B. Frank, and C. Koos, *Silicon Organic Hybrid Technology - A Platform for Practical Nonlinear Optics*, Proc. IEEE **97**, 1304 (2009)
- [A4.4:14] C. Koos, P. Vorreau, T. Vallaitis, P. Dumon, W. Bogaerts, R. Baets, B. Esembeson, I. Biaggio, T. Michinobu, F. Diederich, W. Freude, and J. Leuthold, *All-optical high-speed signal processing with silicon-organic hybrid slot waveguides*, Nature Photon. **3**, 216 (2009)

- [A4.4:15] J. Wang, A. Maitra, W. Freude, and J. Leuthold, *Regenerative properties of interferometric all-optical DPSK wavelength converters*, Opt. Express **17**, 22639 (2009)
- [A4.4:16] T. Vallaitis, S. Bogatscher, L. Alloatti, P. Dumon, R. Baets, M.L. Scimeca, I. Biaggio, F. Diederich, C. Koos, W. Freude, and J. Leuthold, *Optical properties of highly nonlinear silicon-organic hybrid (SOH) waveguide geometries*, Opt. Express **17**, 17357 (2009)
- [A4.4:17] M. Fujii, W. Freude, and J. Leuthold, *Dispersion relation and loss of sub-wavelength confined mode of metal-dielectric-gap optical waveguides*, IEEE Photon. Technol. Lett. **21**, 362 (2009)
- [A4.4:18] P. Dumon, C. Koos, W. Freude, J. Leuthold, W. Bogaerts, and R. Baets, *Silicon-Organic Hybrid Devices for All-Optical Signal Processing*, Future Fab Intl. **30**, (2009)
- [A4.4:19] J. Leuthold, C. Koos, and W. Freude, *Nonlinear silicon photonics*, Nature Photon. **4**, 535 (2010)
- [A4.4:20] T. Vallaitis, R. Bonk, J. Guetlein, D. Hillerkuss, J. Li, R. Brenot, F. Lelarge, G.H. Duan, W. Freude, and J. Leuthold, *Quantum dot SOA input power dynamic range improvement for differential-phase encoded signals*, Opt. Express **18**, 6270 (2010)
- [A4.4:21] S. Sygletos, R. Bonk, T. Vallaitis, A. Marculescu, P. Vorreau, J. Li, R. Brenot, F. Lelarge, G.-H. Duan, W. Freude, and J. Leuthold, *Filter Assisted Wavelength Conversion With Quantum-Dot SOAs*, J. Lightw. Technol. **28**, 882 (2010)
- [A4.4:22] A. Melikyan, N. Lindenmann, S. Walheim, P.M. Leufke, S. Ulrich, J. Ye, P. Vincze, H. Hahn, Th. Schimmel, C. Koos, W. Freude, and J. Leuthold, **Surface plasmon polariton absorption modulator**, Optics Express **19**, 8855 (2011)
- [A4.4:23] T. Alasaarela, D. Korn, L. Alloatti, A. Säynätjoki, A. Tervonen, R. Palmer, J. Leuthold, W. Freude, and S. Honkanen, *Reduced propagation loss in silicon strip and slot waveguides coated by atomic layer deposition*, Optics Express **19**, 11529 (2011)
- [A4.4:24] L. Alloatti, D. Korn, R. Palmer, D. Hillerkuss, J. Li, A. Barklund, R. Dinu, J. Wieland, M. Fournier, J. Fedeli, H. Yu, W. Bogaerts, P. Dumon, R. Baets, C. Koos, W. Freude, and J. Leuthold , *42.7 Gbit/s electro-optic modulator in silicon technology*, Optics Express **19**, 11841(2011)
- [A4.4:25] J. Li, K. Worms, R. Maestle, D. Hillerkuss, W. Freude, and J. Leuthold, *Free-space optical delay interferometer with tunable delay and phase*, Opt. Express **19**, 11654 (2011)

A4.5 ‘Nitrides of Si(111) Substrates for Use in Nonlinear Optical Devices’ (D. Schaad)

[A4.5:1] D.Z. Hu, R. Vöhringer, and D.M. Schaad, *Epitaxial growth of AlN films on Si (111)*, AIP Conf. Proc. (2010) in print

A4.6 ‘Metallic Nanostructures by Nanocontact Printing and Templating: Antennas and Receivers (T. Schimmel)

- [A4.6:1] * ‡ Ch. Poulton, Ch. Koos, M. Fujii, A. Pfrang, Th. Schimmel, J. Leuthold, and W. Freude, *Radiation modes and roughness loss in high index-contrast waveguides*, IEEE J. Sel. Top. Quant. Electron. **12**, 1306 (2006)
- [A4.6:2] J. López Gejo, N. Manoj, S. Sumalekshmy, H. Gliemann, Th. Schimmel, M. Wörner, and A.M. Braun, *Vacuum-ultraviolet photochemically initiated modification of polystyrene surfaces: morphological changes and mechanistic investigations*, Photochem. Photobiol. Sci. **5**, 948 (2006)
- [A4.6:3] * H. Gliemann, Y. Mei, M. Ballauff, and Th. Schimmel, *Adhesion of spherical polyelectrolyte brushes on mica: an in situ AFM investigation*, Langmuir **22**, 7254 (2006)
- [A4.6:4] * ‡ S.M. Pancera, H. Gliemann, Th. Schimmel, and D.F.S. Petri, *Effect of pH on the adsorption and activity of creatine phosphokinase*, J. Phys. Chem. B **110**, 2674 (2006)
- [A4.6:5] * ‡ S.M. Pancera, H. Gliemann, Th. Schimmel, and D.F.S. Petri, *Adsorption behaviour and activity of hexokinase*, J. Colloid Interface Sci. **302**, 417 (2006)
- [A4.6:6] * V. De Pauw, A. Collin, W. Send, J. Hawecker, D. Gerthsen, A. Pfrang, and Th. Schimmel, *Development of texture and deposition rates during the early stages of pyrolytic carbon deposition in a hot-wall reactor*, Carbon **44**, 3091 (2006)
- [A4.6:7] * F. Hennrich, R. Krupke, K. Arnold, J.A.R. Stütz, S. Lebedkin, Th. Koch, Th. Schimmel, and M. Kappes, *The mechanism of cavitation-induced scission of single-walled carbon nanotubes*, J. Phys. Chem. B **111**, 1932 (2007)
- [A4.6:8] ‡ B.J. Mullins, A. Pfrang, R.D. Braddock, Th. Schimmel, and G. Kaspers, *Detachment of liquid droplets from fibres – experimental and theoretical evaluation of detachment force due to interfacial tension effects*, J. Colloid Interface Sci. **312**, 333 (2007)
- [A4.6:9] ‡ V. Zdravkov, A. Sidorenko, A. Rossolenko, V. Ryazanov, I. Bdikin, O. Krömer, E. Nold, Th. Koch, and Th. Schimmel, *Reliable preparation of high-quality superconducting thin MgB₂ films for application*, J. Phys.: Conf. Ser. **61**, 606 (2007)
- [A4.6:10] A. Pfrang, K. Schladitz, A. Wiegmann, and Th. Schimmel, *Calculation of the evolution of surface area and free volume during the infiltration of fiber felts*, Chem. Vap. Deposition **13**, 705 (2007)
- [A4.6:11] * N. Deyneka-Dupriez, U. Herr, H.-J. Fecht, A. Pfrang, Th. Schimmel, B. Reznik, and D. Gerthsen, *Interfacial adhesion and friction of pyrolytic carbon thin films on silicon substrates*, Journal of Materials Research **23**, 2749 (2008)
- [A4.6:12] T. Geldhauser, P. Leiderer, J. Boneberg, S. Walheim, and Th. Schimmel, *Generation of Surface Energy Patterns by Pulsed Laser Interference Lithography on Self-Assembled Monolayers*, Langmuir **24**, 13155 (2008)
- [A4.6:13] * S. Kalinina, H. Gliemann, M. Lopez-Garcia, A. Petershans, J. Auernheimer, Th. Schimmel, M. Bruns, A. Schambony, H. Kessler, and D. Wedlich, *Isothiocyanate-functionalized RGD peptides for tailoring cell-adhesive surface patterns*, Biomaterials **29**, 3004 (2008)
- [A4.6:14] S. Antebieth, A. Brückner-Foit, M.J. Hoffmann, U. Sutter, Th. Schimmel, and M. Müller, *Electromechanical behaviour of PZT with real domain structure*, Computational Materials Science **41**, 420 (2008)
- [A4.6:15] * M. Smetanin, R.N. Viswanath, D. Kramer, D. Beckmann, Th. Koch, L.A. Kibler, D.M. Kolb, and J. Weissmüller, *Surface stress-charge response of a (111)-*

- textured gold electrode under conditions of weak ion adsorption*, *Langmuir* **24**, 8561 (2008)
- [A4.6:16] * ‡ S. Zhong, Th. Koch, M. Wang, T. Scherer, S. Walheim, H. Hahn, and Th. Schimmel, *Nanoscale Twinned Copper Nanowire Formation by Direct Electrodeposition*, *Small* **5**, 2265 (2009)
- [A4.6:17] * B. Schmidt-Hansberg, M.F.G. Klein, K. Peters, F. Buss, J. Pfeifer, S. Walheim, A. Colsmann, U. Lemmer, P. Scharfer, and W. Schabel, *In situ monitoring the drying kinetics of knife coated polymer-fullerene films for organic solar cells*, *J. Appl. Phys.* **106**, 124501 (2009)
- [A4.6:18] * N. Mechau, R. Groeger, A. Prodi-Schwab, and R. Schmeichel, *Reduced conductivity in poly(3,4-ethylenedioxythiophen)-poly(styrene sulfonate) and indium tin oxide nanocomposite for low indium tin oxide content*, *J. Appl. Phys.* **105**, 054318 (2009)
- [A4.6:19] * S. Walheim, M. Barczewski, M. Mayor, A. Blaszczyk, Th. Schimmel: *Verfahren zur Herstellung einer metallorganischen Schicht, mit diesem Verfahren hergestellte metallorganische Schichten und deren Verwendung*, Patent DE-OS 10 2005025693 (2009) und PCT/EP2006/004704 Patent Granted (2009)
- [A4.6:20] L. Pitta Bauermann, P. Gerstel, J. Bill, S. Walheim, Ch. Huang, J. Pfeifer, and Th. Schimmel, *Templated Self-Assembly of ZnO Films on Monolayer Patterns with Nanoscale Resolution*, *Langmuir* **26**, 3774 (2010)
- [A4.6:21] A. Pfrang, Y.-Z. Wan, and Th. Schimmel, *Early stages of the chemical vapor deposition of pyrolytic carbon investigated by atomic force microscopy*, *Carbon* **48**, 921 (2010)
- [A4.6:22] T. Geldhauser, S. Walheim, Th. Schimmel, P. Leiderer, and J. Boneberg, *Influence of the Relative Humidity on the Demixing of Polymer Blends on Prepatterned Substrates*, *Macromolecules* **43**, 1124 (2010)
- [A4.6:23] * ‡ M. Barczewski, S. Walheim, T. Heiler, A. Blaszczyk, M. Mayor, and Th. Schimmel, *High Aspect Ratio Constructive Nanolithography with a Photo-Dimerizable Molecule*, *Langmuir* **26**, 3623 (2010)
- [A4.6:24] F.Z. Zhang, S. Walheim, Th. Schimmel, and O. Marti, *New laser apparatus to measure oscillation amplitude down to picometer at megahertz frequencies*, *Rev. Sci. Instrum.* **81**, 035116 (2010)
- [A4.6:25] * S. Lenhert, F. Brinkmann, T. Laue, S. Walheim, Ch. Vannahme, S. Klinkhammer, M. Xu, S. Sekula, T. Mappes, Th. Schimmel, and H. Fuchs, *Lipid multilayer gratings*, *Nature Nanotechnol.* **5**, 275 (2010)
- [A4.6:26] W. Barthlott, Th. Schimmel, S. Wiersch, K. Koch, M. Brede, M. Barczewski, S. Walheim, A. Weis, A. Kaltenmaier, A. Leder, and H.F. Bohn, *The Salvinia Paradox: Superhydrophobic Surfaces with Hydrophilic Pins for Air Retention under Water*, *Adv. Mater.* **22**, 2325 (2010)
- [A4.6:27] * ‡ S. Montero-Pancera, V. Trouillet, A. Petershans, D. Fichtner, A. Lyapin, M. Bruns, Th. Schimmel, D. Wedlich, S. Reichlmaier, P.G. Weidler, and H. Gliemann, *Design of Chemically Activated Polymer Microwells by One-Step UV-Lithography for Stem Cell Adhesion*, *Langmuir* **26**, 2050 (2010)
- [A4.6:28] ‡ S. Zhong, P. Dupeyrat, R. Groeger, M. Wang, Th. Koch, and Th. Schimmel, *Periodical Nanostructured Multiline Copper Films Self-Organized by Electrodeposition: Structure and Properties*, *J. Nanoscience Nanotechnol.* **10**, 6144 (2010)

- [A4.6:29] * A. Melikyan, T. Vallaitis, N. Lindenmann, Th. Schimmel, W. Freude, and J. Leuthold, *A surface plasmon polariton absorption modulator*, Conf. on Lasers and Electro-Optics (CLEO/IQEC'10), Paper JThE77, (2010)
- [A4.6:30] * R. Schuber, M.M.C. Chou, P. Vincze, Th. Schimmel, and D. Schaad, *Growth of A-plane GaN on (010) LiGaO₂ by plasma-assisted MBE*, J. Crys. Growth **312**, 1665 (2010)
- [A4.6:31] * Th. Schimmel, S. Pancera-Montero, H. Gliemann: *Method for structuring a layer onto a substrate*, Patent EP 1959298B1 Patent Granted (2010)
- [A4.6:32] S. Walheim, R. Gröger, Th. Schimmel: *Dye for Micro-Contact Printing*, Patent EP 2150854A1 (2010) und US 02010 01007907A1 Patent Granted (2010)
- [A4.6:33] * M. Helfrich, D.Z. Hu, J. Hendrickson, M. Gehl, D. Rülke, R. Gröger, D. Litvinov, S. Linden, M. Wegener, D. Gerthsen, Th. Schimmel, M. Hetterich, H. Kalt, G. Khitrova, H.M. Gibbs and D.M. Schaad, *Growth and annealing of InAs quantum dots on pre-structured GaAs substrates*, J. Crys. Growth **323**, 187 (2011)
- [A4.6:34] T. Scherer, S. Zhong, and Th. Schimmel, *Tensile Testing of Microstructures, Imaging and Microscopy* **1**, 44 (2011)
- [A4.6:35] * M. Helfrich, R. Gröger, A. Förste, D. Litvinov, D. Gerthsen, Th. Schimmel, and D. M. Schaad, *Investigation of pre-structured GaAs surfaces for subsequent site-selective InAs quantum dot growth*, Nanoscale Res. Lett. **6**, 211 (2011)
- [A4.6:36] * A. Melikyan, N. Lindenmann, S. Walheim, P.M. Leufke, S. Ulrich, J. Ye, P. Vincze, H. Hahn, Th. Schimmel, C. Koos, W. Freude, and J. Leuthold, *Surface plasmon polariton absorption modulator*, Optics Express **19**, 8855 (2011)
- [A4.6:37] * B. Schmidt-Hansberg, M. Baunach, J. Krenn, S. Walheim, U. Lemmer, P. Scharfer, and W. Schabel, *Spatially resolved drying kinetics of multi-component solution cast films for organic electronics*, Chem. Eng. Proc. **50**, 509 (2011)
- [A4.6:38] C. Obermair, A. Wagner, and Th. Schimmel, *The atomic force microscope as a mechano-electrochemical pen*, Beilstein J. Nanotechnol. **2**, 659 (2011)

Project A5 ‘Bio-Photonics’

A5.4 ‘Optical Biosensors on the Basis of Microdisk-Resonators’ (H. Kalt)

- [A5.4:1] ‡ S.-Y. Seo, R.-J. Zhang, W. Löffler, H. Kalt, K.J. Kim, and M. Zacharias, *Far-field observation of the radial profile of visible whispering-gallery modes in a single microdisk based on Si-nanocrystal/SiO₂ superlattices*, J. Appl. Phys. **106**, 123102 (2009)
- [A5.4:2] T. Grossmann, M. Hauser, T. Beck, C. Gohn-Kreuz, M. Karl, H. Kalt, C. Vannahme, and T. Mappes, *High-Q conical polymeric microcavities*, Appl. Phys. Lett. **96**, 013303 (2010)
- [A5.4:3] M. Hauser, T. Grossmann, S. Schleede, J. Fischer, T. Beck, C. Vannahme, T. Mappes, and H. Kalt, *Fabrication and characterization of high-Q conical polymeric microcavities*, Proc. of SPIE **7716**, 77161Z (2010)
- [A5.4:4] * T. Mappes, C. Vannahme, S. Klinkhammer, U. Bog, M. Schelb, T. Grossmann, M. Hauser, H. Kalt, and Uli Lemmer, *Integrated photonic lab-on-chip systems for biomedical applications*, Proc. of SPIE **7716**, 77160R (2010)
- [A5.4:5] * ‡ T. Grossmann, S. Schleede, M. Hauser, M.B. Christiansen, C. Vannahme, C. Eschenbaum, S. Klinkhammer, T. Beck, J. Fuchs, G.U. Nienhaus, U. Lemmer, A. Kristensen, T. Mappes, and H. Kalt, *Low-threshold conical microcavity dye lasers*, Appl. Phys. Lett. **97**, 063304 (2010)
- [A5.4:6] T. Beck, M. Hauser, T. Grossmann, D. Floess, S. Schleede, J. Fischer, C. Vannahme, T. Mappes and H. Kalt, *PMMA-Micro Goblet Resonators for Biosensing Applications*, Proc. of SPIE Vol. **7888** 78880A-1
- [A5.4:7] * ‡ T. Grossmann, S. Schleede, M. Hauser, M.B. Christiansen, C. Vannahme, C. Eschenbaum, S. Klinkhammer, T. Beck, J. Fuchs, G.U. Nienhaus, U. Lemmer, A. Kristensen, T. Mappes, H. Kalt, *Lasing in dye-doped high-Q conical polymeric microcavities*, Proc. of SPIE Vol. **7913** 79130Y-1
- [A5.4:8] * S. Klinkhammer, T. Grossmann, K. Lüll, M. Hauser, C. Vannahme, T. Mappes, H. Kalt, and U. Lemmer, *Diode-pumped organic semiconductor microcone laser*, IEEE Photonics Technol. Lett. **23**, 489 (2011)
- [A5.4:9] * T. Grossmann, S. Klinkhammer, M. Hauser, D. Floess, T. Beck, C. Vannahme, T. Mappes, U. Lemmer, and H. Kalt, *Strongly confined, low-threshold laser modes in organic semiconductor microgoblets*, Opt. Express **19**, 10009 (2011)
- [A5.4:10] * T. Grossmann, S. Schleede, M. Hauser, T. Beck, M. Thiel, G. v. Freymann, T. Mappes, and H. Kalt, *Direct laser writing for active and passive high-Q polymer microdisks on silicon*, Opt. Express **19**, 11451 (2011)

A5.5 'Organic Nanophotonics for Low-Cost Biosensing' (U. Lemmer)

- [A5.5:1] D. Schneider, U. Lemmer, W. Kowalsky, and T. Riedl, *Low Threshold Organic Semiconductor Lasers*, in book: *Organic Light emitting devices*, K. Müllen and U. Scherf (Eds.), Wiley-VCH (2006)
- [A5.5:2] * K. Forberich, M. Diem, J. Crewett, U. Lemmer, A. Gombert, and K. Busch, *Lasing action in two-dimensional organic photonic crystal lasers with hexagonal symmetry*, *Appl. Phys. B* **82**, 539 (2006)
- [A5.5:3] * 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)
- [A5.5:4] ‡ C. Karnutsch, C. Gaertner, V. Haug, U. Lemmer, T. Farrell, B.S. Nehls, U. Scherf, J. Wang, T. Weimann, G. Heliotis, C. Pflumm, J.C. deMello, and D.D.C. Bradley, *Low Threshold Blue Conjugated Polymer Lasers with First- and Second-Order Distributed Feedback*, *Appl. Phys. Lett.* **89**, 201108 (2006)
- [A5.5:5] C. Gärtner, C. Pflumm, C. Karnutsch, V. Haug, and U. Lemmer, *Numerical study of annihilation processes in electrically pumped organic semiconductor laser diodes*, Proc. SPIE: *Organic Light-Emitting Materials and Devices X*, 63331J (2006)
- [A5.5:6] C. Pflumm, C. Gärtner, C. Karnutsch, and U. Lemmer, *Influence of electronic properties on the threshold behaviour of organic laser diode structures*, Proc. SPIE: *Organic Light-Emitting Materials and Devices X*, 63330W (2006)
- [A5.5:7] C. Gärtner, C. Karnutsch, C. Pflumm, U. Lemmer, *The Influence of Annihilation Processes on the Threshold Current Density of Organic Laser Diodes*, *J. Appl. Phys.* **101**, 023107 (2007)
- [A5.5:8] M. Punke, S. Mozer, M. Stroisch, M.P. Heinrich, U. Lemmer, P. Henzi, and D.G. Rabus, *Coupling of organic semiconductor amplified spontaneous emission into polymeric single-mode waveguides patterned by deep-UV irradiation*, *IEEE Photonic Technol. Lett.* **19**, 61 (2007)
- [A5.5:9] M. Punke, Th. Woggon, M. Stroisch, B. Ebenhoch, U. Geyer, Ch. Karnutsch, M. Gerken, U. Lemmer, M. Bruendel, J. Wang, and Th. Weimann, *Organic semiconductor lasers as integrated light sources for optical sensor systems*, Proc. SPIE **6659**, 665909 (2007)
- [A5.5:10] ‡ C. Karnutsch, C. Pflumm, G. Heliotis, J.C. deMello, D.D.C. Bradley, J. Wang, T. Weimann, V. Haug, C. Gärtner, and U. Lemmer, *Improved organic semiconductor lasers based on a mixed-order distributed feedback resonator design*, *Appl. Phys. Lett.* **90**, 131104 (2007)
- [A5.5:11] C. Karnutsch, M. Stroisch, M. Punke, U. Lemmer, J. Wang, and T. Weimann, *Laser diode pumped organic semiconductor lasers utilizing two-dimensional photonic crystal resonators*, *IEEE Photonic Technol. Lett.* **19**, 741 (2007)
- [A5.5:12] ‡ M. Stroisch, T. Woggon, U. Lemmer, G. Bastian, G. Violakis, and S. Pissadakis, *Organic semiconductor distributed feedback laser fabricated by direct laser interference ablation*, *Opt. Express* **15**, 3968 (2007)
- [A5.5:13] Y. Nazirizadeh, J.G. Müller, U. Geyer, D. Schelle, E.-B. Kley, A. Tünnermann, U. Lemmer, and M. Gerken, *Optical characterization of photonic crystal slabs using orthogonally oriented polarization filters*, *Opt. Express* **16**, 7153 (2008)
- [A5.5:14] Y. Nazirizadeh, U. Lemmer, and M. Gerken, *Experimental quality factor determination of guided-mode resonances in photonic crystal slabs*, *Appl. Phys. Lett.* **93**, 261110 (2008)

- [A5.5:15] * T. Mappes, C. Vannahme, S. Klinkhammer, T. Woggon, M. Schelb, S. Lenhert, J. Mohr, and U. Lemmer, *Polymer biophotonic lab-on-chip devices with integrated organic semiconductor lasers*, Proc. SPIE **7418**, 74180A (2009)
- [A5.5:16] S. Klinkhammer, T. Woggon, U. Geyer, C. Vannahme, T. Mappes, S. Dehm, and U. Lemmer, *A continuously tunable low-threshold organic semiconductor distributed feedback laser fabricated by rotating shadow mask evaporation*, Appl. Phys. B **97**, 787 (2009)
- [A5.5:17] M. Stroisch, C. Teiwes-Morin, T. Woggon, M. Gerken, U. Lemmer, K. Forberich, and A. Gombert, *Photonic stopband tuning of organic semiconductor distributed feedback lasers by oblique angle deposition of an intermediate high index layer*, Appl. Phys. Lett. **95**, 021112 (2009)
- [A5.5:18] T. Mappes, C. Vannahme, M. Schelb, U. Lemmer, and J. Mohr, *Design for optimized coupling of organic semiconductor laser light into polymer waveguides for highly integrated biophotonic sensors*, Microelectron. Eng. **86**, 1499 (2009)
- [A5.5:19] T. Woggon, T. Kleiner, M. Punke, and U. Lemmer, *Nanostructuring of organic-inorganic hybrid materials for distributed feedback laser resonators by two-photon polymerization*, Opt. Express **17**, 2500 (2009)
- [A5.5:20] * C. Vannahme, S. Klinkhammer, A. Kolew, P.-J. Jakobs, M. Guttmann, S. Dehm, U. Lemmer, and T. Mappes, *Integration of organic semiconductor lasers and single-mode passive waveguides into a PMMA substrate*, Microelectron. Eng. **87**, 693 (2010)
- [A5.5:21] T. Woggon, S. Klinkhammer, and U. Lemmer, *Compact Spectroscopy system based on tunable organic semiconductor lasers*, Appl. Phys. B **99**, 47 (2010)
- [A5.5:22] * S. Lenhert, F. Brinkmann, T. Laue, S. Walheim, C. Vannahme, S. Klinkhammer, M. Xu, S. Sekula, T. Mappes, T. Schimmel, and H. Fuchs, *Lipid multilayer gratings*, Nature Nanotechnology **5**, 275 (2010)
- [A5.5:23] M. Stroisch, T. Woggon, C. Teiwes-Morin, S. Klinkhammer, K. Forberich, A. Gombert, M. Gerken, and U. Lemmer, *Intermediate High Index Layer for Laser Mode Tuning in Organic Semiconductor Lasers*, Opt. Express **18**, 5890 (2010)
- [A5.5:24] * C. Vannahme, S. Klinkhammer, F. Brinkmann, S. Lenhert, T. Großmann, U. Lemmer, and T. Mappes, *Highly integrated biophotonics towards all-organic lab-on-chip systems*, Proc. SPIE **7715**, 77151H (2010)
- [A5.5:25] * T. Mappes, C. Vannahme, S. Klinkhammer, U. Bog, M. Schelb, T. Grossmann, M. Hauser, H. Kalt, and U. Lemmer, *Integrated photonic lab-on-chip systems for biomedical applications*, Proc. SPIE **7716**, 77160R (2010)
- [A5.5:26] S. Klinkhammer, T. Woggon, C. Vannahme, U. Geyer, T. Mappes, and U. Lemmer, *Optical spectroscopy with organic semiconductor lasers*, Proc. SPIE **7722**, 77221I (2010)
- [A5.5:27] * Y. Nazirizadeh, U. Bog, S. Sekula, T. Mappes, U. Lemmer, and M. Gerken, *Low-cost label-free biosensors using photonic crystals embedded between crossed polarizers*, Opt. Express **18**, 19120 (2010)
- [A5.5:28] * ‡ T. Grossmann, S. Schleede, M. Hauser, M. B. Christiansen, C. Vannahme, C. Eschenbaum, S. Klinkhammer, T. Beck, J. Fuchs, G.U. Nienhaus, U. Lemmer, A. Kristensen, T. Mappes, and H. Kalt, *Low-threshold conical microcavity dye lasers*, Appl. Phys. Lett. **97**, 063304 (2010)
- [A5.5:29] ‡ C. Vannahme, S. Klinkhammer, M.B. Christiansen, A. Kolew, A. Kristensen, U. Lemmer, and T. Mappes, *All-polymer organic semiconductor laser chips: Parallel fabrication and encapsulation*, Opt. Express **18**, 24881 (2010)

- [A5.5:30] * S. Klinkhammer, T. Grossmann, K. Lüll, M. Hauser, C. Vannahme, T. Mappes, H. Kalt, and U. Lemmer, *Diode-Pumped Organic Semiconductor Microcone Laser*, IEEE Photon. Technol. Lett. **23**, 489 (2011)
- [A5.5:31] * ‡ T. Grossmann, S. Schleede, M. Hauser, M.B. Christiansen, C. Vannahme, C. Eschenbaum, S. Klinkhammer, T. Beck, J. Fuchs, G.U. Nienhaus, U. Lemmer, A. Kristensen, T. Mappes, and H. Kalt, *Lasing in dye-doped high-Q conical polymeric microcavities*, Proc. SPIE **7913**, 79130Y (2011)
- [A5.5:32] C. Vannahme, S. Klinkhammer, U. Lemmer, and T. Mappes, *Plastic lab-on-a-chip for fluorescence excitation with integrated organic semiconductor lasers*, Opt. Express **19**, 8179 (2011)
- [A5.5:33] * T. Grossmann, S. Klinkhammer, M. Hauser, D. Floess, T. Beck, C. Vannahme, T. Mappes, U. Lemmer, and H. Kalt, *Strongly confined, low-threshold laser modes in organic semiconductor microgoblets*, Opt. Express **19**, 10009 (2011)
- [A5.5:34] * B. Rudat, E. Birtalan, S.B.L. Vollrath, D. Fritz, D.K. Kölmel, M. Nieger, U. Schepers, K. Müllen, H.-J. Eisler, U. Lemmer, and S. Bräse, *Photophysical properties of fluorescently-labeled peptoids*, Eur. J. of Med. Chem. **46**, 4457 (2011)
- [A5.5:35] S. Klinkhammer, N. Heussner, K. Huska, T. Bocksrocker, F. Geislhöringer, C. Vannahme, T. Mappes, and U. Lemmer, *Voltage-Controlled Tuning of an Organic Semiconductor Distributed Feedback Laser using Liquid Crystals*, Appl. Phys. Lett. **99**, 023307 (2011)

A5.6 ‘Modeling of Micro-Disk Resonator Arrays’ (K. Busch)

- [A5.6:1] ‡ J. Niegemann, W. Pernice, and K. Busch, *Simulation of Optical Resonators using DGTD and FDTD*, J. Opt. A **11**, 114015 (2009)
- [A5.6:2] J. Niegemann and K. Busch, *Time-stepping and convergence characteristics of the Discontinuous Galerkin Time-Domain approach for the Maxwell equations*, AIP Conf. Proc. **1147**, 22 (2009)
- [A5.6:3] R. Diehl, K. Busch, and J. Niegemann, *Comparison of low-storage Runge-Kutta schemes for Discontinuous-Galerkin Time-Domain simulations of Maxwell’s Equations*, J. Comput. Theor. Nanosci. **7**, 1572 (2010)
- [A5.6:4] ‡ K.R. Hiremath, J. Niegemann, and K. Busch, *Analysis of light propagation in slotted resonator based systems via coupled-mode theory*, Opt. Express **19**, 8641 (2011)

A5.7 ‘Light Activable Nanoparticles and Biomolecules as Structural Basis for Design of Functional Photonic Nanodevices and Switchable Cell Probes’ (Lj. Fruk)

- [A5.7:1] ‡ F. Bano, Lj. Fruk, B. Sanavio, M. Glettenberg, L. Casalis, C.M. Niemeyer, and G. Scoles, *Toward Multiprotein Nanoarrays Using Nanografting and DNA Directed Immobilization of Proteins*, *Nano Lett.* **9**, 2614 (2009)
- [A5.7:2] ‡ P. Youngman and Lj. Fruk, *Save the Hype: Nanotechnology in Antonia Fehrenbach’s Science Novel Der Lotus Effekt*, *Germ. Stud. Rev.* **34**, 1 (2011)
- [A5.7:3] C.H. Kuo, C.M. Niemeyer, and Lj. Fruk, *Bimetallic Copper-Heme-Protein-DNA Hybrid Catalyst for Diels Alder Reaction*, *Cro. Chim. Acta Special Issue* **84**, 315 (2011)
- [A5.7:4] * A. Petershans, D. Wedlich, and Lj. Fruk, *Bioconjugation of CdSe/ZnS Nanoparticles with SNAP tagged proteins*, *Chem. Commun.* **47**, 10671 (2011)
- [A5.7:5] ‡ M. Ali, S. Nasir, P. Ramirez, I. Ahmed, Q.H. Nguyen, Lj. Fruk, S. Mafe, and W. Ensinger, *Optical Gating of Photosensitive Synthetic Ion Channels*, *Adv. Funct. Mater.* 2011, DOI: 10.1002/adfm.201102146
- [A5.7:6] B. Geiseler and Lj. Fruk, *Bifunctional Catechol Based Linkers for Modification of TiO₂ Surfaces*, *J. Mater. Chem.* **22**, 735 (2011)