

Micro- and Nanostructure Research: Cleanroom Linz

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The micro- and nanostructure research in the cleanrooms of the Institut für Halbleiter- und Festkörperphysik and the Institut für Mikroelektronik is supported by the Society for Microelectronics (GMe). In the field of Si/SiGe heterobipolar transistors, the incorporation of carbon was investigated in order to optimize the doping profiles. The material transport during process temperatures in nano-structured Si substrates was investigated as a relevant mechanism for future commercial devices. In the Al-GaAs system, 'Hot electron injection field effect transistors' were modified and quantum point contacts were fabricated. In the field of optoelectronics, Er doped silicon light emitting diodes showed emission at 1.54 μm at room temperature. In the IV-VI system self-organized PbSe quantum dot superlattices were fabricated by molecular beam epitaxy. In the same material system, vertical cavities containing PbSe/PbEuTe superlattices with self-organized PbSe quantum dots, were investigated by transmission spectroscopy. A GaN MOCVD system was installed for the deposition of thin films and the in-situ optical characterization by ellipsometry. Si/SiGe cascade structures were characterized by x-ray reflectivity in order to assess their interface roughness and self-assembled SiGe nano-structures have been investigated by infra-red absorption and photoluminescence spectroscopy.

The funding of the activities in the two cleanrooms at the University of Linz which are jointly used by three groups is of vital importance for our micro- and nanostructure research activities. This basic funding allows for investigations which are made possible through additional funding coming from the FWF, the FFF, the European Commission, as well as through cooperation with industrial groups as listed in the report.

A short overview is given in the following on the achievements made in the year 2001 in the cleanrooms in Linz. The basic equipment which is available in these clean rooms allows for MBE growth of Si-based heterostructures, of II-VI and IV-VI heterostructures, for the deposition of ferromagnetic layers like Fe on II-VI compounds, as well as for MOCVD growth of III-V compounds like GaAs/GaAlAs and GaAs/GaInAs. The latest extension to that material systems happened with a European Project on the in-situ control of GaN deposition by MOCVD. Apart from in-situ and ex-situ structural characterization, lateral patterning is made possible through equipment like optical, holographic and electron beam lithography. Processing includes also facilities for the deposition on insulating as well as contact layers. A plasma deposition system for silicon nitrides was just installed in the last year. The transmission electron microscope, purchased one year earlier, is intensively used for the characterization of thin SiGeC layers.

The research efforts were concentrated on high frequency electronic and optoelectronic devices as described in the following.

Si-SiGe heterobipolar transistors are now widely introduced in the production for high speed bipolar and BiCMOS circuits, offering a great speed advantage over standard silicon technologies. In Linz steps towards the optimization of the doping and composition profiles for the SiGeC HBT technology were continued in collaboration with Austria Microsystems, Unterpremstätten. While it is well known that co-doping of the p-type SiGe base layer of an HBT with carbon can completely suppress transient enhanced diffusion of the boron dopants, little is known about the behavior of carbon. Because of the small solid solubility of C in Si and SiGe, its propensity to form complexes, and its diffusion behavior, which follows the same mechanism as boron, C contaminations are usually avoided in standard Si technology. We therefore studied the behavior of 0.2 - 1 at.% of substitutional C in Si and SiGe under annealing conditions. Fourier-transform infrared spectroscopy (FTIR) was employed to measure the intensity of the local vibration modes of substitutional C and of cubic SiC precipitates. We could follow SiC precipitate formation as a function of annealing temperature and time. We found that, as expected, C in Si forms cubic SiC precipitates in thermal equilibrium. However, this process is kinetically impeded and requires long annealing times at elevated temperatures.

With minimum device dimensions of commercial processes already below 100 nm, and with progress being made regarding self-organized growth schemes selective epitaxy and processing of nano-structured substrates at elevated temperatures become critical issues. During the in-situ thermal cleaning step of nano-structured Si substrates before MBE deposition we found a substantial amount of material transport on the surface. For example, wire structures of rectangular cross section are transformed into trapezoids with $\{311\}$ facets after 5 min of annealing at 950 °C in vacuum. The same mechanism leads to the development of negative slopes on the flanks of SiO₂ wires, which are wetted by mobile surface Si atoms, and desorb after reacting to SiO. By systematically varying the annealing conditions and by cross-sectional transmission electron microscopy (TEM) we studied the kinetics of this phenomena. Especially the shape transformation of SiO₂ structures should allow the fabrication of self-aligned nano shadow masks.

A modified version of a GaAlAs 'Hot Electron Injection Field Effect Transistor' (HEIFET), utilizing the Gunn effect to enhance microwave performance, was developed. In the modified structure the ohmic source and drain contacts of a MESFET are both replaced by a combination of an ohmic contact and a Schottky contact. Due to improvements in the electron beam lithography system it was possible to reduce the length of the MESFET gate to values around 0.4 μm and the separation to values around 0.3 μm. The device operates up to a frequency of 45 GHz.

From two-dimensional AlGaAs structures quantum point contacts were fabricated by electron beam lithography in different techniques. Best electrical characteristics were achieved in split gate geometry. The resistance steps due to lateral quantization of the electron gas were observed. In addition conductance peaks in the high ohmic region due to Coulomb blockade of a random quantum dot appeared in the same samples.

Si:(Er,O) based light emitting diodes were developed and fabricated, emitting at room temperature in the breakdown regime at a wavelength of 1.54 μm. By adjusting the diode design we were able to increase the electroluminescence (EL) intensity by one order of magnitude. We also investigated codoping with hydrogen in order to increase the

luminescence. With this we achieved an increase of the luminescence intensity at temperatures below 150 K by a factor of five.

Self-organized PbSe quantum dot superlattices were fabricated by molecular beam epitaxy. Atomic force microscopy and high resolution x-ray diffraction studies of the ordering processes due to the dot interactions during epitaxial growth showed that well ordered dot superstructures with hexagonal as well as face centered cubic dot arrangements can be obtained. Also, the dot sizes and lateral spacings are found to be tunable by changes in the preset vertical superlattice periods. By inserting such superlattices into the cavity region of high finesse EuTe/PbEuTe microcavity structures optically stimulated mid-infrared vertical laser emission is obtained at wavelengths around 4 μm . Doped quantum dot superlattice structures were also fabricated for photocurrent measurements. These allow the characterization of the quantum dot energy levels. Furthermore, a new research project was started on the investigation of magnetic EuSe layers and superlattices. After optimization of the growth conditions several sample series were fabricated for magnetization and x-ray diffraction measurements. Another activity was centered around the investigation of strain relaxation mechanisms and dislocation formation in lattice-mismatched IV-VI heterostructures using in situ scanning tunneling microscopy. For the PbTe/PbSe (100) system, the formation of regular quasiperiodic nanoscale dislocation patterns were observed with periods down to 8 nm. These patterns could open new possibilities of fabricating novel types of self-organized nanostructures on the periodic strain fields induced by the dislocation grating.

The vertical cavities containing PbSe/PbEuTe superlattices with self-organized PbSe quantum dots, ordered in lateral as well as in vertical direction, were investigated also by transmission experiments. This allows to determine the absorption spectrum of the quantum dot superlattice by deducing it from the width of the resonator modes. The absorption from the quantum dots can be clearly distinguished from that of the wetting layer and the buffer layers. The absorption peak due to the quantum dots is only 8.7 meV broad, which clearly reflects the very high size homogeneity of the dot ensemble in our samples.

An MOCVD system was installed for the deposition of GaN. Additional sources for Al and In are also available for the fabrication of ternary nitrogen based compounds. As dopant sources we have Si for n-type and Mg for p-type. So we are able to grow single and multilayers of group III-nitrides together with the necessary doping profiles to fabricate blue light emitting diodes. However, the main task was to set up an in situ growth control. Therefore the growth reactor was specially designed to allow the attachment of an ellipsometer. The reactor chamber has three optical windows, which allow to measure reflectivity and spectral ellipsometry at an angle of 65°. With this attachment we can measure the growth rate and the layer composition during growth, which occurs at about 1000 °C in very pure hydrogen atmosphere. Post growth analysis of the GaAlN layers by SIMS and AES showed that the composition can be determined during growth with a precision of one percent.

Si/SiGe cascade structures, which show electroluminescence at about 10 μm were characterized by x-ray reflectivity in order to assess their interface roughness. This is of consequence for quantum well fluctuations and consequently for a broadening of the emission. By growing such structures at temperatures as low as 350 °C, the r.m.s. interface roughness can be kept below 0.3 nm, despite Ge contents as high as 45% in the wells.

However, such structures are highly metastable, annealing above 500 °C induces strain relaxation via misfit dislocation formation.

Optical characterization of self-assembled Si/SiGe quantum dots and wires by mid-infrared absorption and photocurrent spectroscopy and near-infrared photoluminescence have been performed. A comparison of the results of these experiments with calculations modeling the dependence of the optical response on the structural parameters of the nanostructures allows to estimate the alloy concentration and dimension of the nanostructures. The results show that the Ge concentration in the nanostructures is significantly lower than in the alloy indicating that significant alloying occurs during the overgrowth of the nanostructures even at moderate growth temperatures.

Project Information

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Publications in Reviewed Journals

Published:

1. A.Daniel, V. Holy, Y. Zhuang, T. Roch, J. Grenzer, Z. Bochnicek, G. Bauer: “*GID study of strains in Si due to patterned SiO₂*”, J. Phys. D: Applied Physics 34, A197-A202 (2001).
2. A.Raab, G. Springholz: “*Oswald Ripening of Facetted Self-Assembled PbSe Quantum Dots during Annealing*”, Phys. stat. sol. (b) 224, 509-513 (2001).

3. Andreev, H. Sitter, C.J. Brabec, P. Hinterdorfer, G. Springholz, N.S. Sariciftci: “*Self-assembled growth of highly ordered para-sexiphenyl thin films*”, *Synthetic Metals* 121, 1379-1380 (2001).
4. C. Schelling, M. Mühlberger, G. Springholz, F. Schäffler: “*SiGe growth instabilities on vicinal Si(001) substrates: Kinetic vs. strain-induced effects*”, *Phys. Rev. B* 64, 041301 (2001).
5. D. De Salvador, M. Tormen, M. Berti, A. V. Drigo, F. Romanato, F. Boscherini, J. Stangl, S. Zerlauth, G. Bauer, L. Colombo, S. Mobilio: “*Local lattice distortion in $Si_{1-x}Ge_x$ epitaxial layers from x-ray absorption fine structure*”, *Phys. Rev. B* 63, 045314 (2001).
6. D. Gruber, M. Mühlberger, F. Schäffler: “*Characterization of Si/Si_{1-x}Ge_x heterostructures for device applications*”, In: *Proceedings of the Seminar “GMe Forum 2001”*, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 171.
7. D. Gruber, T. Fromherz, M. Mühlberger, C. Schelling, L. Palmetshofer, F. Schäffler: “*Characterization of Si/SiGeC heterostructures for device applications*”, In: *Proceedings of the Seminar “GMe Forum 2001”*, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 79-82.
8. E. Thor, M. Mühlberger, L. Palmetshofer, and F. Schäffler: “*Deep-level transient spectroscopy of dislocation-related defects in epitaxial multilayer structures*”, *J. Appl. Phys.* 90, 2252-2256 (2001).
9. F. Schäffler: “*Silicon-Germanium*”, In: *Properties of Advanced Semiconductor Materials*, eds. M.E. Levinshtein, S.L. Rumyantsev, M.S. Shur, John Wiley & Sons, New York 2001, pp. 149-185.
10. G. Brunthaler, A. Prinz, G. Bauer, V.M. Pudalov: “*Exclusion of Quantum Coherence as the Origin of the 2D Metallic State in High-Mobility Silicon Inversion Layers*”, *Phys. Rev. Lett.* 87, 096802 (2001).
11. G. Brunthaler, A. Prinz, G. Pillwein, G. Bauer, K. Brunner, G. Abstreiter, T. Dietl, V.M. Pudalov: “*Semiclassical origin of the 2D metallic state in high mobility Si-MOS and Si/SiGe structures*”, *Proc. 25th International Conference on the Physics of Semiconductors*, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 785-786.
12. G. Springholz, M. Pinczolits, G. Bauer, H.H. Kang, L. Salamanca-Riba: “*Phase diagram of lateral and vertical ordering in self-organized PbSe quantum dot superlattice grown MBE*”, *J. Crystal Growth* 227-228, 1126-1131 (2001).
13. G. Springholz, M. Pinczolits, V. Holy, P. Mayer, G. Bauer, H. Kang, L. Salamanca-Riba: “*Self-assembled molecular beam epitaxy of PbSe quantum dots*”, *Proceedings of the 6th International Symposium on Advanced Physical Fields: “Growth of Well-defined Nanostructures”*, Tsukuba, Japan, 6-9 March, 2001, edited by Nobuyuki Koguchi, National Research Institute for Metals, 2001, p. 97-102.
14. G. Springholz, M. Pinczolits, V. Holy, P. Mayer, G. Bauer, H.H. Kang, L. Salamanca-Riba: “*Controlling of lateral and vertical order in self-organized PbSe quantum dot superlattices*”, *Proc. 25th International Conference on the Physics of*

- Semiconductors, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 355-358.
15. G. Springholz, M. Pinczolits, V. Holy, S. Zerlauth, I. Vavra, G. Bauer: “*Vertical and lateral ordering in self-organized quantum dot superlattices*”, Physica E 9, 149-163 (2001).
 16. G. Springholz, T. Schwarzl, W. Heiss, G. Bauer, M. Aigle, H. Pascher, I. Vavra: “*Midinfrared surface-emitting PbSe/PbEuTe quantum-dot lasers*”, Appl. Phys. Lett. 79, 1225-1227 (2001).
 17. G. Springholz, T. Schwarzl, W. Heiss, M. Aigle, H. Pascher: “*Molecular beam epitaxy of lead-salt-based vertical cavity surface emitting lasers for the 4-6 μm spectral region*”, Journal of Crystal Growth 227-228, 722-728 (2001).
 18. H. H. Kang, L. Salamanca-Riba, M. Pinczolits, G. Springholz, V. Holy, G. Bauer: “*TEM investigation of self-organized PbSe quantum dots as a function of space layer thickness and growth temperature*”, Materials Science and Engineering B (Solid State Materials for Advanced Technology) B80, no.1-3, p.104-107 (2001).
 19. J. Stangl, A. Daniel, V. Holy, T. Roch, G. Bauer, I. Kegel, T.H. Metzger, T. Wiebach, O.G. Schmidt, K. Eberl: “*Strain and composition distribution in free-standing SiGe islands from x-ray diffraction*”, Appl. Phys. Lett. 79, 1474-1476 (2001).
 20. J. Stangl, V. Holy, A. Daniel, T. Roch, G. Bauer, T. H. Metzger, J. Zhu, K. Brunner, G. Abstreiter: “*Shape and size of buried SiGe islands*”, Proc. 25th International Conference on the Physics of Semiconductors, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 363-364.
 21. K. Himmelbauer, H. Sitter, H. Krenn: “*Magnetic properties of thin iron films*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 173-177.
 22. K. Wiesauer, G. Springholz: “*Nano-scale dislocation patterning in PbTe on PbSe (100) heteroepitaxy studied by Scanning Tunneling Microscopy*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 209-212.
 23. M. Aigle, H. Pascher, H. Kim, E. Tarhan, A.J. Mayur, M. Dean Sciacca, A.K. Ramdas, G. Springholz, G. Bauer: “*Optical phonons in PbEuTe epilayers and PbTe/EuTe superlattices: Berreman effect*”, Phys. Rev. B 64, 035316 (2001).
 24. M. Aigle, H. Pascher, M. Pinczolits, G. Springholz, T. Schwarzl, W. Heiss, G. Bauer: “*Optical Characterization of Self-Organized PbSe/Pb_{1-x}Eu_xTe Quantum Dot Superlattices*”, phys. stat. sol. (b) 224, 223-227 (2001).
 25. M.S. Carroll, J.C. Sturm, E. Napolitani, D. De Salvador, M. Berti, J. Stangl, G. Bauer, D.J. Tweet: “*Diffusion enhanced carbon loss from SiGeC layers due to oxidation*”, Phys. Rev. B 64, 3308-3311 (2001).
 26. N. Sandersfeld, W. Jantsch, Z. Wilamowski, F. Schäffler: “*Modulation doped Si/Si_{1-x}Ge_x-field-effect transistors*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 195.

27. N. Sandersfeld, W. Jantsch, Z. Wilamowski, F. Schäffler: “*Conduction Electron Spin Resonance in MBE-Grown Si/SiGe Quantum Wells*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 193.
28. R. Rupprecht, H. Pascher, H. Krenn, W. Faschinger, G. Bauer: “*Coherent Raman spectroscopy of CdTe/MnTe short period superlattices*”, Phys. Rev. B 63, 115325 (2001).
29. R.T. Lechner, A. Raab, G. Springholz, M. Pinczolits, V. Holy, P. Mayer, G. Bauer, H.H. Kang, L. Salamanca-Riba: “*Molecular beam epitaxy of self-organized PbSe quantum dot superlattices*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 189-190.
30. T. Berer, G. Pillwein, G. Brunthaler, G. Strasser: “*Fabrication of AlGaAs nanostructures*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 159-164.
31. T. Ikaida, N. Miura, G. Springholz, M. Pinczolits, G. Bauer: “*Cyclotron resonance in PbSe/PbEuTe quantum dot crystals*”, Proc. 25th International Conference on the Physics of Semiconductors, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 1057-1058.
32. T. Roch, V. Holy, A. Daniel, E. Höflinger, M. Meduna, T.H. Metzger, G. Bauer, J. Zhu, K. Brunner, G. Abstreiter: “*X-ray studies on self-organized wires in SiGe/Si multilayers*”, Journal of Physics D: Appl. Phys. 34, A6-A10 (2001)
33. T. Roch, V. Holy, J. Stangl, E. Höflinger, A. Daniel, G. Bauer, I. Kegel, H. Metzger, J. Zhu, K. Brunner, G. Abstreiter: “*Structural investigations on self-organized Si/SiGe islands by grazing incidence small angle x-ray scattering*”, Phys. stat. sol. (b) 224, 241-245 (2001).
34. T. Schwarzl, W. Heiss, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Lead salt based VCSELs for the 3 - 6 micron range*”, SPIE Proceedings Vol. 4286, p. 172 (2001).
35. T. Schwarzl, W. Heiss, G. Springholz, S. Gianordoli, G. Strasser, M. Aigle, H. Pascher: “*Strongly detuned IV-VI microcavity and microdisk resonances: mode splitting and lasing*”, Proc. 25th International Conference on the Physics of Semiconductors, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 677-678.
36. T. Schwarzl, W. Heiss, G. Springholz, S. Gianordoli, G. Strasser, M. Aigle, H. Pascher: “*Mode Splitting and Lasing in detuned lead salt microcavity and microdisk resonances*”, In: Proceedings of the Seminar “GMe Forum 2001”, Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 197-200.
37. V. Holy, J. Stangl, G. Springholz, M. Pinczolits, G. Bauer: “*High resolution x-ray diffraction from self-organized PbSe/PbEuTe quantum dot superlattices*”, J. Phys. D: Appl. Phys. 34, A1-A5 (2001).

38. V. Holy, J. Stangl, G. Springholz, M. Pinczolits, G. Bauer: "*Lateral and vertical ordering of PbSe self-assembled quantum dots in PbSe/PbEuTe superlattices*", In: Morphological and compositional evolution of heteroepitaxial semiconductor thin films, eds. J. Mirecki Millunchick, A. L. Barabasi, N. A. Modine and E. D. Jones, Symposium Proceedings of Material Research Society, vol. 618, pp. 161-172 (2001).
39. V. Holy, T. Roch, J. Stangl, A. Daniel, G. Bauer, T.H. Metzger, Y. H. Zhu, K. Brunner, G. Abstreiter: "*Grazing incidence small-angle x-ray scattering study of self-organized SiGe wires*", Phys. Rev. B. 63, 205318 (2001).
40. W. Heiss, G. Prechtel, G. Springholz: "*Giant tunability of exciton photoluminescence emission in antiferromagnetic EuTe*", Phys. Rev. B 63, 165323 (2001).
41. W. Heiss, G. Prechtel, G. Springholz: "*Giant tunability of excitonic photoluminescence transitions in antiferromagnetic EuTe epilayers*", Proc. 25th International Conference on the Physics of Semiconductors, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 240-241.
42. W. Heiss, G. Prechtel, G. Springholz: "*Giant tunability of excitonic photoluminescence transitions in antiferromagnetic EuTe epilayers induced by magnetic polarons*", Physica E 10, 419-423 (2001).
43. W. Heiss, G. Prechtel, G. Springholz: "*Magnetic field tunable excitonic photoluminescence transitions in antiferromagnetic EuTe epitaxial layers with an effective g factor in excess of 1000*", Appl. Phys. Lett. 78, 3484-3486 (2001).
44. W. Heiss, T. Schwarzl, G. Springholz: "*Spectroscopy on vertical microcavities for the mid-infrared*", phys. stat. sol. (a) 188, 929-935 (2001).
45. W. Heiss, T. Schwarzl, G. Springholz, K. Biermann, K. Reimann: "*Above-room temperature mid-infrared lasing from vertical cavity surface emitting PbTe quantum-well lasers*", Appl. Phys. Lett. 78, 862-864 (2001).
46. W. Heiss, T. Schwarzl, G. Springholz, T. Fromherz, G. Bauer, M. Aigle, H. Pascher, K. Biermann, K. Reimann: "*Lead-salt microcavities for the mid-infrared*", In: Proceedings of the Seminar "GMe Forum 2001", Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 73-77.
47. W. Heiss, T. Schwarzl, J. Roither, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: "*Epitaxial bragg mirrors for the mid-infrared and their applications*", Progress in Quantum Electronics 25, p. 193 (2002).
48. W. Jantsch, Z. Wilamowski, N. Sandersfeld, F. Schäffler: "*Evidence for screening breakdown near the metal-to-insulator transition in two dimensions*", Proc. 25th International Conference on the Physics of Semiconductors, Sept. 2000, Osaka, Japan, edited by N. Miura, T. Ando, Berlin Heidelberg New York, Springer 2001, p. 859-860.
49. W. Märzinger, H. Krenn: "*In-line Prozesskontrolle mit einem kompakten Echtzeit-FTIR-Spektrometer*", In: Proceedings of the Seminar "GMe Forum 2001", Vienna April 5-6, 2001, edited by K. Riedling, Gesellschaft für Mikroelektronik, Vienna 2001, p. 191.

50. Z. Wilamowski, N. Sandersfeld, W. Jantsch, D. Többen, F. Schäffler: “*Screening Breakdown on the Route toward the Metal-Insulator Transition in Modulation Doped Si/SiGe Quantum Wells*”, Phys. Rev. Lett. **87**, 026401 (2001).
51. Z. Wilamowski, W. Jantsch: “*Spin Resonance Properties of the Two-Dimensional Electron Gas*”, Physica E **10**, 17-21 (2001)
52. W. Jantsch, G. Kocher, L. Palmethofer, H. Przybylinska, M. Stepikhova, H. Preier: “*Optimisation of Er Centers in Si for Reverse Biased Light Emitting Diodes*”, Mat. Sci. & Eng. B **81**, 86-90 (2001)
53. K. Himmelbauer, H. Sitter, H. Krenn: “*Magnetic Properties of Thin Iron Films*”, Proc. GMe-Tagung Wien, 2001
54. E. Thor, M. Mühlberger, L. Palmethofer, F. Schäffler: “*Deep-Level Transient Spectroscopy of Dislocation-Related Defects in Epitaxial Multilayer Structures*”, J. Appl. Phys. **90**, 5, 2252-2256 (2001)
55. T. Schwarzl, W. Heiss, G. Springholz, S. Gianordoli, G. Strasser: “*Mode splitting and lasing in detuned lead salt microcavity and microdisk resonances*”, Proc. GMe Forum 2001, Vienna 2001, ed. by K. Riedling (ISBN: 3-901578-07-2)
56. W. Heiss, T. Schwarzl, G. Springholz, T. Fromherz, G. Bauer, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Lead-salt microcavities for the mid-infrared*”, Proc. GMe Forum 2001, Vienna 2001, ed. by K. Riedling (ISBN: 3-901578-07-2)
57. W. Heiss, G. Prechtel, G. Springholz: “*Giant tunability of exciton photoluminescence emission in antiferromagnetic EuTe*”, Phys. Rev. B **63**, 1653 (2001)
58. M. Aigle, H. Pascher, M. Pinczolics, G. Springholz, T. Schwarzl, W. Heiss, G. Bauer: “*Optical characterization of self-organized PbSe/Pb_{1-x}Eu_xTe quantum dot superlattices*”, phys. stat. sol. (b) **224**, 223 (2001)
59. W. Heiss, G. Prechtel, G. Springholz: “*Giant tunability of excitonic photoluminescence transitions in antiferromagnetic EuTe epilayers induced by magnetic polarons*”, Physica E **10**, 419 (2001)
60. T. Schwarzl, W. Heiss, G. Springholz, S. Gianordoly, G. Strasser, M. Aigle, H. Pascher: “*Strongly detuned IV-VI microcavity and microdisk resonances: mode splitting and lasing*”, Proc. 25th Int. Conf. Physics of Semiconductors, M. Miura, T. Ando (Eds.), Springer, Berlin, 2001, p 677
61. W. Heiss, G. Prechtel, G. Springholz: “*Giant tunability of excitonic photoluminescence transitions in antiferromagnetic EuTe epilayers*”, Proc. 25th Int. Conf. Physics of Semiconductors, M. Miura, T. Ando (Eds.), Springer, Berlin, 2001, p 240
62. W. Heiss, T. Schwarzl, G. Springholz, K. Biermann, K. Reimann: “*Above-room-temperature mid-infrared lasing from vertical cavity surface emitting PbTe quantum-well lasers*”, Appl. Phys. Lett. **78**, 862 (2001)
63. W. Heiss, G. Prechtel, G. Springholz: “*Magnetic-field-tunable photoluminescence transitions in antiferromagnetic EuTe epilayers with an effective g factor of 1140*”, Appl. Phys. Lett. **78**, 3484 (2001)

64. T. Schwarzl, W. Heiss, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Lead salt based VCSELS for the 3 -6 micron range*”, Proc. SPIE, Vol. 4286, p 172 (2001) K.D. Choquette, C. Leit (Eds.)
65. W. Heiss, T. Schwarzl, G. Springholz: “*Spectroscopy on vertical microcavities for the mid-infrared*”, phys. stat. sol. (a) **188**, No. 3, 929-935 (2001)
66. V.G. Shengurov, S.P. Svetlov, V.Yu. Chalkov, G.A. Maksimov, Z.F. Krasil’nik, B.A. Andreev, M.V. Stepikhova, L. Palmetshofer, H. Ellmer: “*Influence of the Growth Condition on Building-Up Processes of Rare Earth Dopants in Silicon Layers During Molecular Beam Epitaxy*”, Proc. Russ. Acad. Sciences, Ser. Phys. **65**, 289 (2001) (in Russian)
67. R.E. Balderas-Navarro, K. Hingerl, A. Bonanni, H. Sitter, D. Stifter: “*In situ observation of stress relaxation in CdTe/ZnTe heterostructures by reflectance difference spectroscopy*”, Appl. Phys. Lett. **78**, 3515 (2001)
68. K. Hingerl, R.E. Balderas-Navarro, A. Bonanni, D. Stifter: “*Influence of anisotropic inplane strain on critical point resonances in reflectance difference spectroscopy*”, J. Vac. Sci.&Techn. B **19**, 1650 (2001)
69. G. Kocher, H. Przybylinska, M. Stepikhova, L. Palmetshofer, W. Jantsch: “*Erbium in SiO₂ environment: ways to improve the 1.54 μm emission*”, Physica B **308-310**, 344-347 (2001)
70. H. Przybylinska, W. Jantsch, A. Kozanecki, D.J. As, K. Lischka: “*Photoluminescence properties of Er-doped GaN*”, Physica B **308-310**, (2001)
71. Kozanecki, H. Przybylinska, D. Kuritsyn, W. Jantsch: “*Site selective excitation of Er³⁺ ions in oxygen-rich silicon*”, Physica B **308-310**, (2001)
72. G. Kocher, W. Jantsch, N. Abrosimov, S. Egorov, A. Zabrodskii, B. Andreev, H.G. Grimmeiss: “*Alloy fluctuations in Si_{1-x}Ge_x crystals*”, Physica B **308-310**, 558-560 (2001)

Submitted / in print:

1. A. A. Darhuber, G. Bauer, P. Schittenhelm, G. Abstreiter: “*Structural Characterization of Self-organized Ge Islands*”, In: “*Self-organized Quantum Dots*”, ed. T.P. Pearsall, Gordon & Breach 2000, in print.
2. A. Andreev, H. Sitter, C. Brabec, P. Hinterdorfer, G. Springholz, N.S. Sariciftci, R. Resel, H. Plank: “*Self-assembled growth of highly oriented para-sexiphenyl thin films controlled by elastic strain*”, Materials Research Society Symposium Proceedings, in print
3. A. Andreev, H. Sitter, N. S. Sariciftci, C. J. Brabec, G. Springholz, P. Hinterdorfer, H. Plank, R. Resel, A. Thierry, and B. Lotz: “*Highly ordered anisotropic nano-needles in para-sexiphenyl films*”, Thin Solid Films 403 – 404, 444 – 448 (2002).
4. A.G. Touryanski, I.V. Pirshin, M.M. Rzaev, M. Mühlberger, F. Schäffler: “*Two wave X-ray optical diagnostics of Ge_xSi_{1-x}/Si modulation doped heterostructures*”, Physica E, in print
5. A. Raab, G. Springholz, R. Lechner, I. Vavra, H. H. Kang, and L. Salamanca-Riba: “*Atomic Force Microscopy and Transmission Electron Microscopy Study of Self-*

- Organized Ordering*”, in “Vertically Aligned PbSe Quantum Dot Superlattices”, Materials Research Society Symposium Proceedings, in print
6. G. Dehlinger, L. Diehl, U. Gennser, H. Sigg, E. Müller, S. Stutz, J. Faist, J. Stangl, T. Roch, G. Bauer, D. Grützmacher: “*Si/SiGe quantum cascade structures emitting in the 10 μ m range*”, Materials Science and Engineering C736 (2001), in print.
 7. G. Grabecki, J. Wrobel, T. Dietl, E. Papis, E. Kaminska, A. Piotrowska, G. Springholz, G. Bauer: “*Spin alignment of electrons in PbTe/(Pb,Eu)Te nanostructures*”, Proceedings 10th International Conference on Modulated Semiconductor Structures (MSS10), Physica E, submitted.
 8. G. Springholz: “*Molecular Beam Epitaxy of IV-VI Heterostructures and Superlattices*”, In: “Lead Chalcogenides: Physics and Applications”, eds. D. Khoklov, Gordon and Breach, in print.
 9. G. Springholz and K. Wiesauer: “*Nanoscale dislocation patterning in PbTePbSe (001) heteroepitaxy*”, Physical Review Letters 88, 015507-1/4 (2002).
 10. G. Springholz, M. Pinczolits, P. Mayer, A. Raab, R. Lechner, V. Holy, G. Bauer, T. Schwarzl, W. Heiss, M. Aigle, H. Pascher, H. Kang, L. Salamanca-Riba: “*Self-assembled PbSe quantum dot superlattices: ordering and device applications*”, Proc. 10th Int. Conf. NGSC 2001, 161-164 (2002).
 11. G. Springholz, T. Schwarzl, W. Heiss, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Fabrication of mid-infrared vertical cavity surface emitting PbTe quantum well lasers for the 3-5 μ m spectral region*”, Proc. 10th Int. Conf. NGSC 2001, 142-144 (2002).
 12. G. Springholz, T. Schwarzl, W. Heiss, T. Fromherz, G. Bauer, M. Aigle, H. Pascher, I. Vavra: “*Fabrication of 3.9-4.2 μ m mid-infrared surface emitting PbSe/PbEuTe quantum dot lasers using molecular beam epitaxy*”, Physica E, in print.
 13. G. Springholz, V. Holy, P. Mayer, M. Pinczolits, A. Raab, R.T. Lechner, G. Bauer, H. Kang, L. Salamanca-Riba: “*Self-organized ordering in self-assembled quantum dot superlattices*”, Material Science and Engineering B88, 143-152 (2002).
 14. H. Kepa, J. Blinowski, P. Kacman, G. Springholz, G. Bauer, C.F. Majkrzak, K.I. Goldman, T.M. Giebultowicz: “*Interlayer exchange in antiferromagnetic-nonmagnetic semiconductor superlattices*”, Proc. ICPS Jerusalem 2000, in print.
 15. Hesse, J. Stangl, V. Holy, T. Roch, G. Bauer, O.G. Schmidt, U. Denker, B. Struth: “*Effect of overgrowth on shape, composition and strain of SiGe islands on Si(001)*”, Phys. Rev. B, submitted.
 16. J. Myslivecek, C. Schelling, F. Schäffler, B. Voigtländer, P. Smilauer, J. Krug: “*Step bunching during Si(001) homoepitaxy caused by the surface diffusion anisotropy*”, Phys. Rev. Lett., submitted.
 17. J. Mysliveček, C. Schelling, G. Springholz, F. Schäffler, B. Voigtländer and P. Šmilauer: “*On the origin of the kinetic growth instability of homoepitaxy on Si(001)*”, Mat. Sci. Eng. B 89, 1-3, 410 - 414 (2002)
 18. J. Stangl, V. Holy, G. Springholz, G. Bauer, I. Kegel, T.H. Metzger: “*Self-organized semiconductor nanostructures: shape, strain and composition*”, Materials Science and Engineering C19, 349-358 (2002).

19. K. Wiesauer, G. Springholz: “*Observation of misfit dislocation formation in PbTe/PbSe (001) lattice-mismatched heteroepitaxy by in situ RHEED and scanning tunneling microscopy*”, IAP Conf. Proc. 2, 45-47(2002).
20. K. Wiesauer and G. Springholz: “*Strain relaxation and dislocation patterning in PbTe/PbSe (001) lattice-mismatched heteroepitaxy*”, Applied Surface Science, in print.
21. K. Wiesauer and G. Springholz: “*Nano-scale dislocation patterning in PbTe on PbSe (100) heteroepitaxy studied by UHV scanning tunneling microscopy*”, Physica E, in print.
22. L. Diehl, H. Sigg, G. Dehlinger, D. Grützmacher, E. Müller, U. Gennser, I. Sagnes, T. Fromherz, Y. Campidelli, O. Kermarrec, D. Bensahel, J. Faist: “*Intersubband absorption performed on p-type modulation doped Si_{0.2}Ge_{0.8}/Si quantum wells grown on Si_{0.5}Ge_{0.5} pseudo-substrate*”, Appl. Phys. Lett., submitted.
23. M. Meduna, V. Holy, T. Roch, G. Bauer, O. G. Schmidt, K. Eberl: “*Diffuse x-ray reflectivity from self-assembled ripples with superimposed roughness in Si/Ge superlattices*”, Semicond. Sci. Technol., in print.
24. M. Mühlberger, C. Schelling, G. Springholz and F. Schäffler: “*Step bunching and strain effects in Si_{1-x}Ge_x layers and superlattices on vicinal Si(001)*”, Physica E, in print
25. M. Mühlberger, C. Schelling, G. Springholz and F. Schäffler: “*Step-bunching and strain-effects in Si_{1-x}Ge_x layers and superlattices grown on vicinal Si(001)*”, Mat. Sci. Eng. B 89, 1-3, 257 - 262 (2002)
26. M.S. Carroll, J.C. Sturm, E. Napolitani, D. De Salvador, M. Berti, J. Stangl, G. Bauer, D.J. Tweet: “*Silicon interstitial driven loss of substitutional carbon from SiGeC structures*”, Proc. Symp. Mat. Res. Soc. 669, in print (2001). (presented Symp. MRS, San Francisco, CA, April, 2001, page numbers not avail. yet)
27. N. Sandersfeld, M. Mühlberger, W. Jantsch, Z. Wilamowski, F. Schäffler : “*Spin lifetimes and g-factor tuning in Si/SiGe quantum well*”, Physica E, in print
28. A. Raab, R. T. Lechner, G. Springholz: “*Self-organized lateral ordering for vertically aligned PbSe/PbEuTe quantum dot superlattices*”, Appl. Phys. Lett. 80, 1273-1275 (2002).
29. T. Fromherz, W. Mac, A. Hesse, G. Bauer, C. Miesner, K. Brunner, G. Abstreiter: “*Intraband absorption and photocurrent spectroscopy of self-assembled p-type Si/SiGe quantum dots*”, Appl. Phys. Lett., in print.
30. T. Fromherz, W. Mac, C. Miesner, K. Brunner, G. Bauer, G. Abstreiter: “*Intersubband transitions of boron doped self-assembled Ge quantum dots*”, Physica E (2002), in print.
31. T. Ikaida, N. Miura, S. Tsujino, S.J. Allen, G. Springholz, M. Pinczolits, G. Bauer: “*Study of electronic states in PbSe/PbEuTe quantum dot crystals by cyclotron resonance at very high magnetic fields*”, IAP Conf. Proc. 2, 48-50 (2002)..
32. T. Roch, M. Meduna, J. Stangl, A. Hesse, R. Lechner, G. Bauer, G. Dehlinger, L. Diehl, U. Gennser, E. Müller, D. Grützmacher: “*Interface roughness in SiGe*

- quantum-cascade structures from x-ray reflectivity studies*”, J. Appl. Phys., submitted.
33. T. Roch, V. Holy, A. Hesse, J. Stangl, T. Fromherz, G. Bauer, T.H. Metzger, S. Ferrer: “*Strain in buried self-assembled SiGe wires studied by grazing-incidence x-ray diffraction*”, Phys. Rev. B, submitted.
 34. T. Schwarzl, W. Heiss, G. Springholz, K. Biermann, K. Reimann: “*Above-room temperature operation of IV-VI microcavity lasers*”, Physica E, in print.
 35. V.M. Pudalov, G. Brunthaler, A. Prinz, G. Bauer: “*Weak anisotropy of the in-plane magnetoresistance in high mobility (100) Si-MOS structures*”, Phys. Rev. Lett., in print.
 36. C. Skierbiszewski, P. Perlin, P. Wisniewski, T. Suski, J. Geisz, K. Hingerl, W. Jantsch, D. Mars, W. Walukiewicz: “*Band structure and optical properties of $In_xGa_{1-x}As_{1-y}N_y$* ”, Phys. Rev. B
 37. W. Jantsch, Z. Wilamowski, N. Sandersfeld, M. Mühlberger, F. Schäffler: “*Spin lifetimes and g-factor tuning in Si/SiGe quantum wells*”, Physica E
 38. C. Skierbiszewski, S. P. Sepkowski, P. Perlin, T. Suski, W. Jantsch, J. Geisz: “*The effective mass and conduction band states of GaAsN/GaAs quantum wells*”, Physica E
 39. G. Kocher, H. Przybylinska, M. Stepikhova, L. Palmethofer, W. Jantsch: “*Erbium in SiO_x environment: ways to improve the 1.54 μm emission*”, Physica B
 40. Kozanecki, H. Przybylinska, D. Kuritsyn, W. Jantsch: “*Site selective excitation of Er^{3+} ions in oxygen-rich Silicon*”, Proc. ICDS-21, Gießen 2001, Physica B
 41. W. Heiss, T. Schwarzl, J. Roither, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Epitaxial bragg mirrors for the mid-infrared and their applications*”, Progress in Quantum Electronics
 42. T. Schwarzl, W. Heiss, G. Springholz, K. Biermann, K. Reimann: “*Above-room-temperature operation of IV-VI microcavity lasers*”, Physica E

Presentations

Invited Talks:

1. T. Schwarzl, W. Heiss, G. Springholz, M. Aigle and H. Pascher, (invited): “*Lead salt vertical cavity surface emitting lasers for the 3 - 6 μm wavelength range*”, Photonics West, 22.1.-28.1.2001, San Francisco, USA
2. G. Brunthaler: “*Exclusion of quantum coherence as the origin of the 2D Metallic State in Si-MOS*”, Invited talk at the Minerva Workshop, Dead Sea resort, Israel, March 26th - 28th, 2001
3. G. Springholz: “*Self-organized MBE growth of narrow gap PbSe quantum dots*”, 10th International Conference on Narrow Gap Semiconductors and Related Small Energy Phenomena, Physics and Applications, 27.5.-31-5-2001, Ishikawa, Japan

4. J. Stangl, V. Holy, G. Bauer, I. Kegel, T.H. Metzger: “*Semiconductor Nanostructures: shape, strain and composition*”, E-MRS 2001 Spring Meeting, Strasbourg, France, June 5-8, 2001.
5. G. Springholz: “*Vertical and lateral ordering in self-organized quantum dot superlattices*”, E-MRS 2001 Spring Meeting, Strasbourg, France, June 5-8, 2001.
6. G. Springholz: “*Quantum dots in IV-VI diluted magnetic semiconductors*”, 1st CELDIS Workshop on Low Dimensional and Hybrid Diluted Magnetic Semiconductor Structures, 22.6. - 23.6.2001, Obory, Poland.
7. G. Springholz: “*Selbst-Organisierte Quantenpunkte in IV-VI Halbleitern*”, Physik Kolloquium der Universität Bayreuth, 3.7.2001, Bayreuth, Germany
8. G. Springholz: “*Selbst-Organisierte Halbleiter-Quantenpunkte - Ordnungsphänomene und praktische Anwendungen*”, Seminar am Institut für Physik der kondensierten Materie, Heinrich Heine Universität Düsseldorf, 4.7.2001, Düsseldorf, Germany.
9. J. Stangl, G. Bauer, V. Holy: “*Determination of strain and composition of self-organized islands using x-ray diffraction techniques*”, 4th International Workshop “Modelling, Growth, Properties and Devices of Epitaxial Semiconductors on Novel Index Surfaces” (NIS’01), Aspet, France, September 16-20, 2001.
10. G. Springholz: “*Self-organized Growth of Semiconductor Nanostructures*”, Combined 15th International Vacuum Congress and 11th International Conference on Solid Surfaces and 48th International Symposium of the American Vacuum Society, San Francisco, 28.10.-2.11.2001.
11. G. Bauer: “*Characterization of quantum dots by x-ray diffraction*”, International Symposia “Röntgen’s Heritage, Quantum Hall Effect and Heterostructures”, University of Würzburg, Germany, December 11-15, 2001.
12. W. Jantsch, Z. Wilamowski, N. Sandersfeld, and F. Schäffler: “*Spin resonance of the two-dimensional electron gas - a new method to investigate potential fluctuations*”, Workshop “Science and Technology in Nanostructures and Low Dimensional Materials” (STNLD ‘01), Granada, 28 February – 3 March, 2001
13. W. Heiss: “*PbTe/EuTe-Vielschichtstrukturen: Vom exotischen Halbleiter zum optischen Bauelement*”, Walter-Schottky-Seminar, TU München, June 2001
14. T. Schwarzl, W. Heiss, G. Springholz, K. Biermann, K. Reimann, M. Aigle, H. Pascher: “*Midinfrared surface-emitting quantum well and quantum dot lasers based on IV-VI semiconductors*”, Mini-Symposium on Application of Free Electron Lasers, Cumbria, U.K., Sept. 2001
15. T. Schwarzl, W. Heiss, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Lead-salt-based vertical-cavity surface-emitting lasers for the 3 – 6 micron range*”, Mid-Infrared Network Meeting, Guildford, U.K., July 2001
16. G. Springholz, M. Pinczolits, P. Mayer, A. Raab, R. Lechner, V. Holy, G. Bauer, T. Schwarzl, W. Heiss, M. Aigle, H. Pascher, H.H. Kang, L. Salamanca-Riba: “*Self-assembled PbSe quantum dot superlattices: Ordering and device applications*”, 10th Int. Conf. Narrow Gap Semiconductors, Ishikawa, Japan, May 2001

17. W. Heiss, T. Schwarzl, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Spectroscopy on vertical microcavities for the mid-infrared*”, Int. Workshop on Microcavity Light Sources, Paderborn, Germany, April 2001
18. W. Heiss, T. Schwarzl, G. Springholz: “*Bleisalz-Mikroresonatoren für das mittlere Infrarot*”, GMe-Forum 2001, Wien, April 2001
19. T. Schwarzl, W. Heiss, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Lead salt based VCSELs for the 3 – 6 micron range*”, Photonic West – Optoelectronics 2001, St. Jose, USA, Jan. 2001
20. H. Sitter, A. Bonanni, D. Stifter, K. Hingerl: “*MOCVD growth of GaN*”, Review Seminar on Scientific Cooperation between Austria and Poland, May 2001
21. H. Sitter: “*Herstellung epitaktischer Schichten*”, Physikkolloquium TU Graz, May 2001
22. H. Sitter: “*Epitaxial growth – close and far away from thermodynamic equilibrium*”, Pre-Conference School, Jaszowiec, Poland, June 2001
23. H. Sitter: “*Molecular-beam epitaxy – fundamentals and application*”, Iberomeric School on Epitaxial Growth of Semiconductor Nanostructures, Univ. Sao Paulo, Nov. 2001
24. H. Sitter: “*In-situ characterization in MBE systems*”, Iberomeric School on Epitaxial Growth of Semiconductor Nanostructures, Univ. Sao Paulo, Brasilien, Nov. 2001
25. H. Sitter: “*Organic epilayers grown by hot-wall epitaxy*”, Instituto de Pesquisas Espaciais, San Jose dos Campos, Brasilien, Nov. 2001
26. A. Bonanni: “*Optical polarization probes on semiconductor and metal surfaces*”, Physikkolloquium Univ. Graz, June 2001

Conference presentations (talks and posters):

1. A. Raab, R. Lechner, and G. Springholz: “*Self-Organized Lateral Ordering in Vertically Aligned PbSe Quantum Dot Superlattices*”, Fall Meeting of the Materials Research Society, Boston 26.-30.1.2001
2. C. Schelling, M. Mühlberger, G. Springholz, F. Schäffler: “*The surface morphology of single Si_{1-x}Ge_x layers grown on vicinal Si (001): step bunching and strain-effects*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
3. C. Schelling, M. Mühlberger, G. Springholz, F. Schäffler: “*The surface morphology of single SiGe layers grown on vicinal Si (001)*”, Euro-MBE, Hinterzarten (Germany), 05.-07.02.01
4. D. Gruber, M. Mühlberger, F. Schäffler: “*Characterization of Si/Si_{1-x}yGe_xC_y heterostructures for device applications*”, Seminar “GMe Forum 2001”, Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
5. D. Gruber, M. Mühlberger, T. Fromherz, F. Schäffler, M. Schatzmayr: “*Fourier Transform Infrared Investigations of SiC Structures for HBT Applications*”, 2nd Int. Conf. Si MBE and Heterostructures, Straßburg (France) 05. - 08.05.01.

6. D. Gruber, T. Fromherz, M. Mühlberger, C. Schelling, L. Palmetshofer, F. Schäffler: "*Characterization of Si/SiGeC heterostructures for device applications*", Seminar "GMe Forum 2001", Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
7. D. Gruber, M. Mühlberger, T. Fromherz, F. Schäffler: "*Fourier-Transform Infrared Investigations of SiC Structures for HBT Applications*", MRS Fall Meeting, Boston (USA) 26. - 30.11.2001
8. G. Grabecki, J. Wrobel, T. Dietl, E. Papis, E. Kaminska, A. Piotrowska, G. Springholz, G. Bauer: "*Spin alignment of electrons in PbTe/(Pb,Eu)Te nanostructures*", 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
9. G. Springholz, M. Pinczolits, P. Mayer, A. Raab, R. Lechner, V. Holy, G. Bauer, T. Schwarzl, W. Heiß, M. Aigle, H. Pascher, H. Kang, L. Salamanca-Riba: "*Self-assembled PbSe quantum dot superlattices: ordering and device applications*", 10th International Conference on Narrow Gap Semiconductors, May 27-31, 2001, Ishikawa, Japan.
10. G. Springholz, R. T. Lechner, M. Pinczolits, P. Mayer, V. Holy, G. Bauer: "*Tuning of vertical and lateral correlations in self-organized quantum dot superlattices*", 4th International Workshop "Modelling, Growth, Properties and Devices of Epitaxial Semiconductors on Novel Index Surfaces" (NIS'01), Aspet, France, September 16-20, 2001.
11. G. Springholz, T. Schwarzl, W. Heiss, M. Aigle, H. Pascher, K. Biermann, K. Reimann: "*Fabrication of mid-infrared vertical cavity surface emitting PbTe quantum well lasers for the 3-5 μm spectral region*", 10th International Conference on Narrow Gap Semiconductors, May 27-31, 2001, Ishikawa, Japan.
12. G. Springholz, T. Schwarzl, W. Heiss, M. Aigle, H. Pascher, T. Fromherz, G. Bauer: "*Mid-infrared surface-emitting PbSe/PbEuTe quantum dot lasers*", 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
13. G. Springholz and K. Wiesauer: "*Dislocation patterning in PbTe on PbSe (100) lattice-mismatched heteroepitaxy studied by scanning tunneling microscopy*", 10th International Conference on Narrow Gap Semiconductors and Related Small Energy Phenomena, Physics and Applications, 27.5.-31-5-2001, Ishikawa, Japan
14. G. Springholz and K. Wiesauer: "*Strain relaxation and misfit dislocation formation in PbTe/PbSe (001) heteroepitaxy*", European Materials Research Society Spring Meeting, 5.6.-8.6.2001, Strasbourg, France.
15. J. Myslivecek, C. Schelling, G. Springholz, F. Schäffler, B. Voigtländer, P. Šmilauer: "*On the Microscopic Origin of Kinetic Growth Instabilities in Si(001) Homoepitaxy*", MRS Fall Meeting, Boston (USA) 26. - 30.11.2001
16. J. Stangl, G. Bauer, A. Hesse, T. Roch, V. Holy, M. Pinczolits, G. Springholz: "*X-Ray scattering from Semiconductor Nanostructures*", NESY Ferienschule "Forschung mit Röntgen- und Neutronenstreuung an Europäischen Großforschungsanlagen", Planneralp 2001, March 11-17, 2001.

17. J. Myslivecek, C. Schelling, G. Springholz, F. Schäffler, B. Voigtländer, P. Šmilauer: “*On the origin of the kinetic growth instability of homoepitaxy on Si (001)*”, 2nd Int. Conf. Si MBE and Heterostructures, Straßburg (France) 05. - 08.05.01.
18. K. Wiesauer, G. Springholz: “*Observation of misfit dislocation formation in PbTe/PbSe (001) lattice-mismatched heteroepitaxy by in situ RHEED and scanning tunneling microscopy*”, 10th International Conference on Narrow Gap Semiconductors, May 27-31, 2001, Ishikawa, Japan.
19. K. Wiesauer, G. Springholz: “*Nano-scale dislocation patterning in PbTe on PbSe (100) heteroepitaxy studied by UHV scanning tunneling microscopy*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
20. K. Wiesauer, G. Springholz: “*Nano-scale dislocation patterning in PbTe on PbSe (100) heteroepitaxy studied by Scanning Tunneling Microscopy*”, Seminar “GMe Forum 2001”, Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
21. K. Wiesauer, G. Springholz: “*Growth spirals far from thermodynamic equilibrium in PbTe molecular beam epitaxy on BaF₂ (111)*”, European Conference on Molecular Beam Epitaxy, 2.1.-8.2.2001, Hinterzarten, Germany.
22. K. Wiesauer, G. Springholz: “*Strain relaxation mechanisms and dislocation patterning in PbTe on PbSe (100) heteroepitaxy*”, European Conference on Molecular Beam Epitaxy, 2.1.-8.2.2001, Hinterzarten, Germany
23. M. Mühlberger, C. Schelling, G. Springholz, F. Schäffler: “*Step bunching and strain-effects in Si_{1-x}Ge_x layers and Superlattices grown on vicinal Si(001)*”, 2nd Int. Conf. Si MBE and Heterostructures, Straßburg (France) 05. - 08.05.01.
24. M. Mühlberger, C. Schelling, G. Springholz, F. Schäffler: “*Step bunching and strain-effects in Si_{1-x}Ge_x layers and Superlattices grown on vicinal Si(001)*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001
25. R. T. Lechner, A. Raab, G. Springholz, M. Pinczolits, V. Holy, P. Mayer, G. Bauer, H. Kang, L. Salamanca-Riba: “*Finite size effects in the vertical and lateral ordering of self-organized PbSe quantum dot superlattices*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
26. R. T. Lechner, A. Raab, G. Springholz, M. Pinczolits, V. Holy, P. Mayer, G. Bauer, H. H. Kang, L. Salamanca-Riba: “*Molecular beam epitaxy of self-organized PbSe quantum dot superlattices*”, Seminar “GMe Forum 2001”, Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
27. R. T. Lechner, A. Raab, G. Springholz, M. Pinczolits, V. Holy, P. Mayer, G. Bauer, H. Kang, and L. Salamanca-Riba: “*The dot size dependence of vertical and lateral and vertical ordering in self-organized PbSe quantum dot superlattices*”, European Conference on Molecular Beam Epitaxy, 2.1.-8.2.2001, Hinterzarten, Germany
28. T. Berer, G. Pillwein, G. Brunthaler, G. Strasser: “*Fabrication of AlGaAs nanostructures*”, Seminar “GMe Forum 2001”, Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
29. T. Ikaida, N. Miura, S. Tsujino, P. Xomalin, S.J. Allen, G. Springholz, M. Pinczolits, G. Bauer: “*Study of electronic states in PbSe/PbEuTe quantum dot*

- crystals by cyclotron resonance at very high magnetic fields*”, 10th International Conference on Narrow Gap Semiconductors, May 27-31, 2001, Ishikawa, Japan.
30. T. Schwarzl, W. Heiss, G. Springholz, K. Biermann, K. Reimann: “*Above-room temperature operation of IV-VI microcavity lasers*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
 31. T. Schwarzl, W. Heiss, G. Springholz, S. Gianordoli, G. Strasser, M. Aigle, H. Pascher: “*Mode Splitting and Lasing in detuned lead salt microcavity and microdisk resonances*”, Seminar “GMe Forum 2001”, Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
 32. T. Schwarzl, W. Heiß, G. Springholz, K. Biermann, K. Reimann, M. Aigle, H. Pascher: “*Advances in IV-VI vertical emitting lasers: Above-room-temperature operation and quantum dots as active material*”, IVth International Conference on Mid-Infrared Optoelectronics - Materials and Devices MIOMD, 2.-3.4.2001, Montpellier, France.
 33. W. Heiss, T. Schwarzl, G. Springholz, T. Fromherz, G. Bauer, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Lead-salt microcavities for the mid-infrared*”, Seminar “GMe Forum 2001”, Gesellschaft für Mikroelektronik, Vienna, April 5-6, 2001.
 34. W. Heiss, T. Schwarzl, G. Springholz, M. Aigle, H. Pascher, K. Biermann, K. Reimann: “*Spectroscopy on vertical microcavities for the mid-infrared*”, Workshop on Microcavity Light Sources, 6.-7.4.2001, Paderborn, Germany
 35. W. Mac, T. Fromherz, C. Miesner, K. Brunner, G. Bauer, G. Abstreiter: “*Intersubband transitions in boron doped self-assembled Ge quantum dots*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, Austria, July 23-27, 2001.
 36. N. Sandersfeld, M. Mühlberger, W. Jantsch, Z. Wilamowski, F. Schäffler: “*Spin life times and g-factor tuning in Si/Ge quantum wells*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, 23-27 July 2001
 37. Z. Wilamowski, W. Jantsch: “*Determination of the Rashba field in modulation doped Si/SiGe quantum wells from conduction electron spin resonance*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, 23-27 July 2001
 38. C. Skierbiczewski, S. P. Lepkowski, P. Perlin, T. Suski, W. Jantsch: “*The effective mass and conduction band states of GaAsN/GaAs quantum wells*”, 10th International Conference on Modulated Semiconductor Structures (MSS10), Linz, 23-27 July 2001
 39. Z. Wilamowski and W. Jantsch: “*ESR studies of the Bychkov-Rashba field in modulation doped Si/SiGe quantum wells*”, 14th Int. Conf. Electronic Props. of Two-Dimensional Systems, EP2DS-14, Prague 2001
 40. G. Kocher, H. Przybylinska, M. Stepikhova, L. Palmethofer and W. Jantsch: “*Erbium in SiO_x environment: Ways to improve the 1.54 μm emission*”, 21st International Conference on Defects in Semiconductors, ICDS-21, Gießen, 16-20 July 2001

41. G. Kocher, W. Jantsch, N. Abrosimov, S. Egorov, A. Zabrodskii, B. Andreev, H.G. Grimmeiss: “*Alloy fluctuations in $Si_{1-x}Ge_x$ crystals*”, 21st International Conference on Defects in Semiconductors, ICDS-21, Gießen, 16-20 July 2001
42. H. Przybylinska, W. Jantsch, A. Kozanecki, D.J. As, K. Lischka: “*Photoluminescence properties of Er-doped GaN*”, 21st International Conference on Defects in Semiconductors, ICDS-21, Gießen, 16-20 July 2001
43. A. Kozanecki, H. Przybylinska, D. Kuritsyn, W. Jantsch: “*Site selective excitation of Er^{3+} ions in oxygen-rich Silicon*”, 21st International Conference on Defects in Semiconductors, ICDS-21, Gießen, 16-20 July 2001
44. T. Schwarzl, W. Heiss, G. Springholz, K. Biermann, K. Reimann: “*Above-room-temperature operation of IV-VI microcavity lasers*”, 10th Int. Conf. On II-VI Compounds, Bremen, Germany, Sept. 2001
45. T. Schwarzl, W. Heiss, G. Springholz, T. Fromherz, A. Raab, I. Vavra: “*Mid-infrared absorption of PbSe/PbEuTe quantum dot superlattices in IV-VI microcavities*”, 7th Int. Conf. On Optics and Excitons in Confined Systems, Montpellier, France, Sept. 2001
46. M. Böberl, W. Heiss, T. Schwarzl, G. Springholz: “*IV-VI resonant-cavity photodetectors for the mid-infrared*”, Int. Workshop on Microcavity Light Sources, Paderborn, Germany, April 2001
47. T. Schwarzl, W. Heiss, G. Springholz, S. Gianordoli, G. Strasser, M. Aigle, H. Pascher: “*Stark verstimmte Resonanzen in IV-VI Mikroresonatoren und Mikrodisks: Modenaufspaltung und Lasertätigkeit*”, GMe-Forum 2001, Wien, April 2001
48. T. Schwarzl, W. Heiss, G. Springholz, K. Biermann, K. Reimann, M. Aigle, H. Pascher: “*Advances in IV-VI vertical emitting lasers: Above-room-temperature operation and quantum dots as active material*”, IV. Int. Conf. on Mid-Infrared Optoelectronics Materials and Devices, Montpellier, France, April 2001
49. R.E. Balderas-Navarro, A. Bonanni, D. Stifter, H. Sitter, K. Hingerl: “*Reflectance difference spectroscopy during CdTe/ZnSe interface formation*”, 8th Int. Conf. On the Formation of Semiconductor Interfaces (ICFSI-8), Sapporo, Japan, June 2001
50. R.E. Balderas-Navarro, A. Bonanni, D. Stifter, A. Montaigne-Ramil, H. Sitter, K. Hingerl: “*Collective dimer stress induced dichroism in II-VI semiconductors*”, 10th Int. Conf. On II-VI Compounds, Bremen, Germany, Sept. 2001
51. K. Himmelbauer, H. Sitter, H. Krenn: “*Magnetic properties of thin iron films*”, GMe-Forum 2001, Wien, April 2001
52. H. Sitter, A. Andreev: “*Kristalline dünne Filme aus Para-Hexaphenyl hergestellt mit Hot-Wall-Epitaxie*”, GMe-Forum 2001, Wien, April 2001
53. H. Plank, R. Resel, J. Keckes, A. Andreev, H. Sitter, S. Purger, A. Thierry, B. Lotz: “*Epitaxial growth of para-sexiphenyl films on mica characterized with x-ray diffraction pole figure technique*”, 10th Int. Conf. On Modulated Semiconductor Structures (MSS10), Linz, Austria, July 2001
54. A. Andreev, C.J. Brabec, N.S. Sariciftci, P. Hinterdorfer, H. Sitter, G. Springholz, H. Plank, R. Resel: “*Investigation of highly ordered para-sexiphenyl structures by*

- atomic force microscopy*”, European Material Research Society Meeting, Symposium P, Strassbourg, July 2001
55. H. Sitter: “*Hot-wall epitaxy – the method of choice for the growth of highly ordered organic epilayers*”, Material Research Society Meeting, San Francisco, Symposium C, April 2001
56. A. Andreev, C.J. Brabec, N.S. Sariciftci, H. Sitter, G. Springholz, P. Hinterdorfer: “*Self-assembled growth of highly oriented para-sexiphenyl thin films controlled by elastic strain*”, Material Research Society Meeting, San Francisco, Symposium C, April 2001
57. A. Andreev, H. Sitter, C.J. Brabec, R. Resel, H. Plank, N.S. Sariciftci: “*Morphology and growth of highly ordered para-sexiphenyl structures deposited by HWE*”, Verhandlungen der Deutschen Physikalischen Gesellschaft, Symposium Organische Festkörper, Hamburg, March 2001

Doctor's Theses

Finished in 2001:

1. Dipl. Phys. Nils Sandersfeld: “*Modulationsdotierte Si/SiGe and Si/SiGeC Feldeffekttransistoren*”
2. Dipl.-Ing. Erik Thor: “*Untersuchung tiefer Störstellen in Si und SiGeC*”

Current works:

1. Dipl. Phys. Anke Hesse: “*Strukturelle Untersuchungen an Halbleiternanostrukturen*”
2. Dipl. Phys. Tobias Schüllli: “*Magnetic Nanostructures: GID and XMCD investigations*”
3. Dipl. Ing. Michael Mühlberger: “*Epitaktisches Wachstum von modulationsdotierten Si/SiGe Si/SiGeC Heterostrukturen*”
4. Dipl. Ing. Adrian Prinz: “*Untersuchung von Lokalisierungseffekten in Halbleiterstrukturen mittels Magnetotransport*”
5. M.Sc. Tomas Roch: “*Characterization of semiconductor nanostructures*”
6. Dipl. Ing. Karin Wiesauer: “*Scanning tunneling microscopy studies of dislocation structures in IV-VI heterostructures*”
7. Dipl. Ing. Anneliese Raab: “*Molecular beam epitaxy of self-assembled IV-VI quantum dots*”
8. Mag. Rainer T. Lechner: “*Herstellung und Charakterisierung von EuSe-Nanostrukturen*”
9. Dipl.-Ing. Gernot Fattinger: “*Methoden zur statistischen und dynamischen Charakterisierung von Mikrostrukturen*”
10. Dipl.-Ing. Gudrun Kocher-Oberlehner: “*Er-dotiertes Si und SiGe für optoelektronische Anwendungen im Bereich von 1,54 μm* ”

11. M.Sc. Alberto Montaigne-Ramil: "*Fabrication and ex-situ characterization of wide band gap semiconductor materials*"
12. Dipl.-Ing. Klaus Schmidegg: "*Growth and optical characterization of GaAlN and GaInN*"
13. Dipl.-Ing. Thomas Schwarzl: "*Vertikal emittierende Bleisalzlasers*"

Diploma Theses

Finished in 2001:

1. Georg Pillwein: "*Elektronische Eigenschaften von Halbleiterstrukturen bei tiefen Temperaturen*"
2. Thomas Berer: "*Herstellung und Untersuchung von Halbleiternanostrukturen*"
3. Daniel Gruber: "*Substitutioneller Kohlenstoff in dotierten Si/SiGeC Heterostrukturen*"
4. Eva Breuer: "*Untersuchungen an Halbleiternanostrukturen mittels Röntgenbeugung und -reflexion*"

Current works:

1. Wolfgang Schwinger: "*Transmissionselektronenmikroskopie an Halbleiternanostrukturen*"
2. Herbert Lichtenberger: "*Überwachen und Charakterisierung strukturierter Si-Substrate*"
3. Mathias Simma: "*Photoleitungsuntersuchungen an Quantenpunkten*"
4. Stefan Griesser: "*Leitfähigkeitsmessungen an zweidimensionalem Elektronengas*"
5. Böberl Michaela: "*Bauelemente mit vertikalen Resonatoren basierend auf Blei-Salz-Metallstrukturen*"
6. Roither Jürgen: "*Mikroresonatoren aus dielektrischen Bragg-Spiegeln für lichtemittierende II-VI-Halbleiterbauelemente*"

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