

CV

Dr. rer. nat. Jan Christoph Goldschmidt

Qualifications

- 08/2005-11/2009 **PhD (Dr. rer. nat.) in Physics** at **University of Konstanz**, Germany and Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany, Dissertation “Novel Solar Cell Concepts”, Grade: Summa cum laude
- World record efficiency of luminescent solar concentrator system
 - First successful demonstration of efficiency increase due to application of photonic structures to luminescent solar concentrators
- 10/1999-02/2005 **Dipl.–Phys.** at **Albert-Ludwigs Universität Freiburg**, Germany and University of New South Wales (UNSW), Sydney, Australia
Diploma Thesis: „Highly efficient multi-crystalline silicon solar cells“ contributing to world record in conversion efficiency for multi-crystalline silicon solar cells, Grade: Very good

Employment

- Since 01/2010 **Head of Team** “Novel Solar Cell Concepts” at **Fraunhofer Institute for Solar Energy Systems ISE**, Freiburg, Germany, permanent position, 6 months family leave in 2011 and 2016
- Building excellent research team, initiating and developing new fields of research
 - Leading research team with currently 10 employees
 - Coordinating collaborative BMWi project “PersiST” targeted at realizing high efficiency perovskite silicon tandem solar cells
 - Coordinating European FP7 project “Nanospec – Nanomaterials for harvesting sub-band-gap photons via upconversion to increase solar cell efficiencies”, targeted at realizing a system architecture I invented during my PhD
 - Establishing an internationally recognized research agenda aimed at generating and realizing new ideas how to overcome the fundamental limits of solar energy conversion
 - Development of silicon-based tandem solar cells
 - Investigating novel materials for photon management and solar cell applications
 - Developing theoretical models for photonic structures and luminescence phenomena
 - Manufacturing nanophotonic structures for the control of luminescence and light trapping
 - Setting up a labs for calibrated photoluminescence measurements and solar cell characterization, as well as perovskite-silicon tandem solar cell manufacturing
- 09/2012-09/2013 **Visiting Researcher** at **Imperial College**, London, United Kingdom in the Department of Physics
- Investigating the fundamental efficiency limits of upconversion of low energy photons with thermodynamic approaches
 - Assessing economic and technological pathways of future solar photovoltaic technology developments
- 04/2005-06/2005 Associate Intern **McKinsey & Company Inc.**, Consultant in Risk Management

Grants & Awards

- 2016 **BMW collaborative project**, “PersiST – Perovskite Silicon Tandem Solar Cells” overall volume 4.5 Mio€, of which around 1.5 Mio available for research at Fraunhofer ISE
- 2015 **Sustainability Centre Freiburg**, Pilot Project “Nanostructures for luminescence enhancement increasing the efficiency of LEDs and solar cells”, volume 280 k€
- 2013 **Dahrendorf-Fellowship** for short-term stay at Mercator Research Institute on Global Commons and Climate Change, Berlin, Germany
- 2012 **PostDoc research grant** German Academic Exchange Service (DAAD) funding stay at Imperial College, London
- 2011 **BMBF collaborative project** Infravolt (2011-2014) and **DFG project** Nanosun II, with a joint volume of around 600 k€
- 2010 **EU FP7 Project** “Nanospec” overall volume 4.2 Mio, around 900 k€ at Fraunhofer ISE
- Since 2010 Acquisition of several internal and **industry projects**, overall volume more than 270 k€.
- 2005 **PhD scholarships** from Deutsche Bundesstiftung Umwelt (DBU), Studienstiftung des deutschen Volkes and Heinrich-Böll Foundation
- 1999-2005 **Student scholarships** from Studienstiftung des deutschen Volkes and German Academic Exchange Service (DAAD)

Supervision

- Since 2010 **8 PhD students**, who received scholarships from Deutsche Bundes Stiftung Umwelt, Reiner-Lemoine Stiftung, Heinrich-Böll Stiftung and Chinese Academy of Science
- Since 2005 **18 Master and Bachelor students**, of which at least 3 won scholarships

Teaching Activities

- 2015/2016 **Contribution to lecture series** of Prof. S. W. Glunz “Photovoltaics” and “Photovoltaics 2” at Albert-Ludwigs University Freiburg, Germany
- 2014 and 2015 **Invited lecture** “High efficiency silicon solar cells” at Karlsruhe Institute of Technology KIT, Germany
- Since 2012 **Tutor (“Vertrauensdozent”)** of **Heinrich-Böll Foundation**
- 2012 Contribution to **online Master programme “Photovoltaics”** of Albert-Ludwigs University Freiburg, Germany, on topics of Photon Management in Photovoltaics

Organisation of Scientific Meetings

- 2015 **DPG Focus Session** “Nanophotonic concepts and materials for energy harvesting – Plasmonics, transformation optics, upconversion and beyond”, Berlin, Germany
- Since 2013 **OSA topical meeting** “Optical Nanostructures and Advanced Materials for Photovoltaics”
- 2013 **International workshop** “Advanced Systems for Photon Management for Photovoltaics”, Freiburg, Germany
- 2006 **Interdisciplinary seminar** “Energy, Power and Rationality”, Tübingen, Germany

Commissions of Trust

- 2015 **Scientific Evaluator**, Technology Foundation STW, The Netherlands
- 2014 **Scientific Evaluator**, Fund for Scientific Research (F.R.S.-FNRS), Belgium
- 2014 **PhD Thesis Evaluator**, Martin-Luther-University Halle-Wittenberg, Germany
- 2012 **PhD Thesis Evaluator**, University of Sydney, Australia
- Since 2005 **Reviewer** for Applied Physics Letters, J. of Physical Chemistry, J. of Physics and Chemistry of Solids, J. of Spacecraft and Rockets, Nature Energy, Nature Nanotechnology, Progress in Photovoltaics, Scientific Reports, Solar Energy Materials & Solar Cells

Publications

Overview

- Publication of 51 journal papers and 69 conference papers, 4 granted patents (detailed lists below)
- Main topics: Upconversion, luminescent solar concentrators, spectral splitting and light trapping
- H-Index 23 (Google Scholar, September 2016)
- 1800 Citations (Google Scholar, September 2016)

Research Topics and Highlights

Rigorous characterization of upconverter materials and devices

S. Fischer, E. Favilla, M. Tonelli, and J. C. Goldschmidt, "Record efficient upconverter solar cell devices with optimized bifacial silicon solar cells and monocrystalline BaY₂F₈. 30% Er³⁺ upconverter", **Solar Energy Materials & Solar Cells** 136, 0, 127–134 (2015). *23 citations*

Realization of world-record upconverter solar cell devices

J. C. Goldschmidt, S. Fischer, P. Löper, K. W. Krämer, D. Biner, M. Hermle, and S. W. Glunz, "Experimental analysis of upconversion with both coherent monochromatic irradiation and broad spectrum illumination", **Solar Energy Materials & Solar Cells** 95, 7, 1960–1963 (2011). *63 citations*

First time characterization of a silicon solar cell upconverter device under broad-band illumination

S. Fischer, J. C. Goldschmidt, P. Löper, G. H. Bauer, R. Brüggemann, K. Krämer, D. Biner, M. Hermle, and S. W. Glunz, "Enhancement of silicon solar cell efficiency by upconversion. Optical and electrical characterization", **Journal of applied physics** 108, 4, 44912 (2010). *165 citations*

Rigorous optical and electrical characterization of upconverter materials and devices, demonstration of world record (at that time) irradiance normalized upconversion quantum yield

Luminescent solar concentrators

J. C. Goldschmidt, M. Peters, A. Bösch, H. Helmers, F. Dimroth, S. W. Glunz, and G. Willeke, "Increasing the efficiency of fluorescent concentrator systems", **Solar Energy Materials & Solar Cells** 93, 176–182 (2009). *148 citations*

Realization of world record (at that time) efficient luminescent solar concentrator system, demonstration of 20% efficiency gain by the application of a spectrally selectively reflecting photonic structure

Control of Luminescence phenomena with photonic structures

J. Gutmann, H. Zappe, and J. C. Goldschmidt, "Quantitative modeling of fluorescent emission in photonic crystals", **Physical Review B** 88, 20 (2013). *11 citations*

B. Herter, S. Wolf, S. Fischer, J. Gutmann, B. Bläsi, and J. C. Goldschmidt, "Increased upconversion quantum yield in photonic structures due to local field enhancement and modification of the local density of states - a simulation-based analysis", **Optics Express** 21, 18, A883-A900 (2013). *19 citations*

S. Fischer, F. Hallermann, T. Eichelkraut, G. von Plessen, K. W. Krämer, D. Biner, H. Steinkemper, M. Hermle, and J. C. Goldschmidt, "Plasmon enhanced upconversion luminescence near gold nanoparticles - simulation and analysis of the interactions", **Optics Express** 20, 1, 271–282 (2012). *65 citations*

Comprehensive theoretical modeling of the interaction of different photonic structures (photonic crystals, plasmonics) with upconversion luminescence and conventional luminescence phenomena taking into account effects of local irradiance enhancement, local photon density of states and internal dynamics of the luminescence species

Light trapping in silicon solar cells

J. Eisenlohr, B. G. Lee, J. Benick, F. Feldmann, M. Drießen, N. Milenkovic, B. Bläsi, J. C. Goldschmidt, and M. Hermle, “Rear side sphere gratings for improved light trapping in crystalline silicon single junction and silicon-based tandem solar cells”, **Solar Energy Materials & Solar Cells** 142, 60–65 (2015). 12 citations

Realization of high-efficiency silicon solar cells featuring a novel rear-side light trapping sphere grating structure with world-record efficiency for planar silicon solar cells.

Publications in peer-reviewed journals

1. N. Tucher, J. Eisenlohr, H. Gebrewold, P. Kiefel, O. Höhn, H. Hauser, J. C. Goldschmidt, and B. Bläsi, “Optical simulation of photovoltaic modules with multiple textured interfaces using the matrix-based formalism OPTOS”, **Optics Express** 24, 14, A1083 (2016).
2. J. Eisenlohr, N. Tucher, H. Hauser, M. Graf, J. Benick, B. Bläsi, J. C. Goldschmidt, and M. Hermle, “Efficiency increase of crystalline silicon solar cells with nanoimprinted rear side gratings for enhanced light trapping”, **Solar Energy Materials & Solar Cells** 155, 288–293 (2016).
3. E. Favilla, G. Cittadino, S. Veronesi, M. Tonelli, S. Fischer, J. C. Goldschmidt, A. Cassanho, and H. P. Jenssen, “Comparative analysis of upconversion efficiencies in fluoride materials for photovoltaic application”, **Solar Energy Materials & Solar Cells** 157, 415–421 (2016).
4. S. Fischer, D. Kumar, F. Hallermann, G. von Plessen, and J. C. Goldschmidt, “Enhanced upconversion quantum yield near spherical gold nanoparticles – a comprehensive simulation based analysis”, **Optics Express** 24, 6, A460 (2016).
5. F. Pfeffer, J. Eisenlohr, A. Basch, M. Hermle, B. G. Lee, and J. C. Goldschmidt, “Systematic analysis of diffuse rear reflectors for enhanced light trapping in silicon solar cells”, **Solar Energy Materials & Solar Cells** 152, 80–86 (2016).
6. A. J. Bett, J. Eisenlohr, O. Höhn, P. Repo, H. Savin, B. Bläsi, and J. C. Goldschmidt, “Wave optical simulation of the light trapping properties of black silicon surface textures”, **Optics Express** 24, 6, A434 (2016).
7. C. L. M. Hofmann, B. Herter, S. Fischer, J. Gutmann, and J. C. Goldschmidt, “Upconversion in a Bragg structure: photonic effects of a modified local density of states and irradiance on luminescence and upconversion quantum yield”, **Optics Express** 24, 13, 14895–14914 (2016).
8. J. Eisenlohr, B. G. Lee, J. Benick, F. Feldmann, M. Drießen, N. Milenkovic, B. Bläsi, J. C. Goldschmidt, and M. Hermle, “Rear side sphere gratings for improved light trapping in crystalline silicon single junction and silicon-based tandem solar cells”, **Solar Energy Materials and Solar Cells** 142, 60–65 (2015).
9. N. Tucher, J. Eisenlohr, P. Kiefel, O. Höhn, H. Hauser, M. Peters, C. Müller, J. C. Goldschmidt, and B. Bläsi, “3D optical simulation formalism OPTOS for textured silicon solar cells”, **Optics Express** 23, 24, A1720 (2015).
10. J. C. Goldschmidt and S. Fischer, “Upconversion for Photovoltaics - a Review of Materials, Devices and Concepts for Performance Enhancement”, **Advanced Optical Materials** 3, 4, 510–535 (2015).
11. M. F. Schumann, S. Wiesendanger, J. C. Goldschmidt, B. Bläsi, K. Bittkau, U. W. Paetzold, A. Sprafke, R. B. Wehrspohn, C. Rockstuhl, and M. Wegener, “Cloaked contact grids on solar cells by coordinate transformations: Designs and prototypes”, **Optica** 2, 10, 850–853 (2015).
12. J. Eisenlohr, N. Tucher, O. Höhn, H. Hauser, M. Peters, P. Kiefel, J. C. Goldschmidt, and B. Bläsi, “Matrix formalism for light propagation and absorption in thick textured optical sheets”, **Optics Express** 23, 11, A502 (2015).
13. S. Fischer, E. Favilla, M. Tonelli, and J. C. Goldschmidt, “Record efficient upconverter solar cell devices with optimized bifacial silicon solar cells and monocrystalline BaY_2F_8 . 30% Er^{3+} upconverter”, **Solar Energy Materials & Solar Cells** 136, 0, 127–134 (2015).

14. G. E. Arnaoutakis, J. Marques-Hueso, A. Ivaturi, S. Fischer, J. C. Goldschmidt, K. W. Krämer, and B. S. Richards, "Enhanced energy conversion of up-conversion solar cells by the integration of compound parabolic concentrating optics", **Solar Energy Materials & Solar Cells** 140, 217–223 (2015).
15. N. Tucher, J. Eisenlohr, H. Hauser, J. Benick, M. Graf, C. Müller, M. Hermle, J. C. Goldschmidt, and B. Bläsi, "Crystalline silicon solar cells with enhanced light trapping via rear side diffraction grating", **Energy Procedia** 77, 253–262 (2015).
16. G. E. Arnaoutakis, J. Marques-Hueso, A. Ivaturi, K. W. Kraemer, S. Fischer, J. C. Goldschmidt, and B. S. Richards, "Enhanced up-conversion for photovoltaics via concentrating integrated optics", **Optics Express** 22, 5, A452-A464 (2014).
17. F. Creutzig, J. C. Goldschmidt, P. Lehmann, E. Schmid, F. von Blücher, C. Breyer, B. Fernandez, M. Jakob, B. Knopf, S. Lohrey, T. Susca, and K. Wiegandt, "Catching two European birds with one renewable stone - Mitigating climate change and Eurozone crisis by an energy transition", **Renewable and Sustainable Energy Reviews** 38, 0, 1015–1028 (2014).
18. J. Eisenlohr, J. Benick, M. Peters, B. Bläsi, J. C. Goldschmidt, and M. Hermle, "Hexagonal sphere gratings for enhanced light trapping in crystalline silicon solar cells", **Optics Express** 22, S1, A111-A119 (2014).
19. S. Fischer, B. Fröhlich, H. Steinkemper, K. W. Krämer, and J. C. Goldschmidt, "Absolute upconversion quantum yield of β -NaYF₄ doped with Er³⁺ and external quantum efficiency of upconverter solar cell devices under broad-band excitation considering spectral mismatch corrections", **Solar Energy Materials & Solar Cells** 122, 0, 197–207 (2014).
20. S. Fischer, A. Ivaturi, B. Fröhlich, M. Rudiger, A. Richter, K. W. Krämer, B. S. Richards, and J. C. Goldschmidt, "Upconverter Silicon Solar Cell Devices for Efficient Utilization of Sub-Band-Gap Photons Under Concentrated Solar Radiation", **IEEE Journal of Photovoltaics** 4, 1, 183–189 (2014).
21. S. Fischer, B. Fröhlich, K. W. Kramer, and J.-C. Goldschmidt, "Relation Between Excitation Power Density and Er³⁺ Doping Yielding the Highest Absolute Upconversion Quantum Yield", **The Journal of Physical Chemistry C** 118, 51, 30106–30114 (2014).
22. S. Fischer, R. Martín-Rodríguez, B. Fröhlich, K. W. Krämer, A. Meijerink, and J. C. Goldschmidt, "Upconversion Quantum Yield of Er³⁺-doped β -NaYF₄ and Gd₂O₂. The Effects of Host Lattice, Er³⁺ Doping, and Excitation Spectrum Bandwidth", **Journal of Luminescence** 153, 281–287 (2014).
23. Martínez Díez, Ana Luisa, J. Gutmann, J. Posdziech, T. Rist, D. G. Plaza, and J. C. Goldschmidt, "Optimized scalable stack of fluorescent solar concentrator systems with bifacial silicon solar cells", **Journal of applied physics** 116, 15, 154507 (2014).
24. M. Rüdiger, S. Fischer, J. Frank, A. Ivaturi, B. S. Richards, K. W. Krämer, M. Hermle, and J. C. Goldschmidt, "Bifacial n-type silicon solar cells for upconversion applications", **Solar Energy Materials & Solar Cells** 128, 0, 57–68 (2014).
25. C. Breyer, C. Birkner, J. Meiss, J. C. Goldschmidt, and M. Riede, "A top-down analysis - Determining photovoltaics R&D investments from patent analysis and R&D headcount", **Energy Policy** 62, 1570–1580 (2013).
26. S. Fischer, F. Hallermann, T. Eichelkraut, G. von Plessen, K. W. Krämer, D. Biner, H. Steinkemper, M. Hermle, and J. C. Goldschmidt, "Plasmon enhanced upconversion luminescence near gold nanoparticles - simulation and analysis of the interactions. Errata", **Optics Express** 21, 9, 10606–10611 (2013).
27. J. C. Goldschmidt, C. Do, M. Peters, and A. Goetzberger, "Spectral splitting module geometry that utilizes light trapping", **Solar Energy Materials & Solar Cells** 108, 0, 57–64 (2013).
28. J. Gutmann, H. Zappe, and J. C. Goldschmidt, "Quantitative modeling of fluorescent emission in photonic crystals", **Physical Review B** 88, 20 (2013).
29. B. Herter, S. Wolf, S. Fischer, J. Gutmann, B. Bläsi, and J. C. Goldschmidt, "Increased upconversion quantum yield in photonic structures due to local field enhancement and modification

- of the local density of states - a simulation-based analysis”, **Optics Express** 21, 18, A883-A900 (2013).
30. R. Martin-Rodriguez, S. Fischer, A. Ivaturi, B. Fröhlich, K. W. Krämer, J. C. Goldschmidt, B. S. Richards and A. Meijerink, “Highly Efficient IR to NIR Upconversion in $\text{Gd}_2\text{O}_3:\text{Er}^{3+}$ for Photovoltaic Applications”, **Chemistry of Materials** 25, 9, 1912–1921 (2013).
 31. H. Steinkemper, S. Fischer, M. Hermle, and J. C. Goldschmidt, “Stark level analysis of the spectral line shape of electronic transitions in rare earth ions embedded in host crystals”, **New Journal of Physics** 15, 5, 053033 1–5303316 (2013).
 32. S. Fischer, F. Hallermann, T. Eichelkraut, G. von Plessen, K. W. Krämer, D. Biner, H. Steinkemper, M. Hermle, and J. C. Goldschmidt, “Plasmon enhanced upconversion luminescence near gold nanoparticles - simulation and analysis of the interactions”, **Optics Express** 20, 1, 271–282 (2012).
 33. S. Fischer, H. Steinkemper, P. Löper, M. Hermle, and J. C. Goldschmidt, “Modeling upconversion of erbium doped microcrystals based on experimentally determined Einstein coefficients”, **Journal of applied physics** 111, 13109 (2012).
 34. J. C. Goldschmidt, S. Fischer, H. Steinkemper, F. Hallermann, G. von Plessen, K. W. Krämer, D. Biner, and M. Hermle, “Increasing upconversion by plasmon resonance in metal nanoparticles - a combined simulation analysis”, **IEEE Journal of Photovoltaics** 2, 2, 134–140 (2012).
 35. J. Frank, M. Rüdiger, S. Fischer, J. C. Goldschmidt, and M. Hermle, “Optical Simulation of Bifacial Solar Cells”, **Energy Procedia** 27, 300–305 (2012).
 36. J. Gutmann, M. Peters, B. Bläsi, M. Hermle, A. Gombert, H. Zappe, and J. C. Goldschmidt, “Electromagnetic simulations of a photonic luminescent solar concentrator”, **Optics Express** 20, S2, A157-67 (2012).
 37. J. C. Goldschmidt, S. Fischer, P. Löper, K. W. Krämer, D. Biner, M. Hermle, and Glunz, S. W., “Experimental analysis of upconversion with both coherent monochromatic irradiation and broad spectrum illumination”, **Solar Energy Materials & Solar Cells** 95, 7, 1960–1963 (2011).
 38. P. Löper, R. Müller, D. Hiller, T. Barthel, E. Malguth, S. Janz, J. C. Goldschmidt, M. Hermle, and M. Zacharias, “Quasi-Fermi-level splitting in ideal silicon nanocrystal superlattices”, **Physical Review B** 84, 195317 (2011).
 39. B. Mitchell, G. Peharz, G. Siefert, M. Peters, T. Gandy, J. C. Goldschmidt, J. Benick, S. W. Glunz, A. Bett, and F. Dimroth, “Four-junction spectral beam-splitting photovoltaic receiver with high optical efficiency”, **Progress in Photovoltaics: Research and Applications** 19, 1, 61–72 (2011).
 40. M. Peters, J. C. Goldschmidt, and B. Bläsi, “Efficiency limit and example of a photonic solar cell”, **Journal of applied physics** 110, 4, - (2011).
 41. M. Peters, C. Ulbrich, J. C. Goldschmidt, J. Fernandez, G. Siefert, and B. Bläsi, “Directionally selective light trapping in a germanium solar cell”, **Optics Express** 19, S2, A136-45 (2011).
 42. S. Fischer, J. C. Goldschmidt, P. Löper, G. H. Bauer, R. Brüggemann, K. Krämer, D. Biner, M. Hermle, and Glunz, S. W., “Enhancement of silicon solar cell efficiency by upconversion. Optical and electrical characterization”, **Journal of applied physics** 108, 4, 44912 (2010).
 43. M. Peters, J. C. Goldschmidt, and B. Bläsi, “Angular confinement and concentration in photovoltaic converters”, **Solar Energy Materials & Solar Cells** 94, 8, 1393–1398 (2010).
 44. M. Peters, J. C. Goldschmidt, P. Löper, B. Groß, J. Üpping, F. Dimroth, R. B. Wehrspohn, and B. Bläsi, “Spectrally-selective photonic structures for PV applications”, **Energies** 3, 2, 171–193 (2010).
 45. J. C. Goldschmidt, M. Peters, A. Bösch, H. Helmers, F. Dimroth, S. W. Glunz, and G. Willeke, “Increasing the efficiency of fluorescent concentrator systems”, **Solar Energy Materials & Solar Cells** 93, 176–18282 (2009).
 46. J. C. Goldschmidt, M. Peters, M. Hermle, and Glunz, S. W., “Characterizing the light guiding of fluorescent concentrators”, **Journal of applied physics** 105, 114911 (2009).

47. M. Peters, J. C. Goldschmidt, T. Kirchartz, and B. Bläsi, "The photonic light trap - Improved light trapping in solar cells by angularly selective filters", **Solar Energy Materials & Solar Cells** 93, 10, 1721–1727 (2009).
48. M. Peters, J. C. Goldschmidt, P. Löper, B. Bläsi, and A. Gombert, "The effect of photonic structures on the light guiding efficiency of fluorescent concentrators", **Journal of applied physics** 105, 14909 (2009).
49. B. Ahrens, P. Löper, J. C. Goldschmidt, S. W. Glunz, B. Henke, P.-T. Miclea, and S. Schweizer, "Neodymium-doped fluorochlorozirconate glasses as an upconversion model system for high efficiency solar cells", **physica status solidi a** 205, 12, 2822–2830 (2008).
50. A. Goetzberger, J. C. Goldschmidt, M. Peters, and P. Löper, "Light trapping, a new approach to spectrum splitting", **Solar Energy Materials & Solar Cells** 92, 12, 1570–1578 (2008).
51. J. C. Goldschmidt, M. Peters, L. Prönneke, L. Steidl, R. Zente, B. Bläsi, A. Gombert, S. W. Glunz, G. Willeke, and U. Rau, "Theoretical and experimental analysis of photonic structures for fluorescent concentrators with increased efficiencies", **physica status solidi (a)** 205, 12, 2811–2821 (2008).

International/national books and book chapters

1. J.C. Goldschmidt, L. Prönneke, A. Büchtemann, J. Gutmann, L. Steidl, M. Dyrba, M.-C. Wiegand, B. Ahrens, A. Wedel, S. Schweizer, B. Bläsi, R. Zentel, and U. Rau, *Fluorescent concentrators for photovoltaic applications*, in **Photonmanagement in Solar Cells**, R. Wehrspohn, U. Rau, and A. Gombert (Editors), Wiley-VCH (2015)
2. J.C. Goldschmidt, S. Fischer, H. Steinkemper, B. Herter, S. Wolf, F. Hallermann, G.v. Plessen, J.A. Johnson, B. Ahrens, P.-T. Miclea, and S. Schweizer, *Up-conversion materials for enhanced efficiency of solar cells*, in **Photonmanagement in Solar Cells**, R. Wehrspohn, U. Rau, and A. Gombert (Editors), Wiley-VCH (2015)
3. C. Ulbrich, M. Peters, S. Fahr, J. Üpping, T. Kirchartz, C. Rockstuhl, J.C. Goldschmidt, A. Gerber, F. Lederer, R. Wehrspohn, B. Bläsi, and U. Rau, *Light-Trapping in Solar Cells by Directionally Selective Filters*, in **Photonmanagement in Solar Cells**, R. Wehrspohn, U. Rau, and A. Gombert (Editors), Wiley-VCH (2015)
4. J.C. Goldschmidt, *Luminescent solar concentrator*, in **Comprehensive renewable energy**, A. Sayigh (Editor) Elsevier, Oxford, UK, p. 587-601 (2012)
5. M. Peters, A. Bielawny, B. Bläsi, R. Carius, S. Glunz, J.C. Goldschmidt, H. Hauser, M. Hermle, T. Kirchartz, P. Löper, J. Üpping, R. Wehrspohn, and G. Willeke, *Photonic concepts for solar cells*, in **Physics of nanostructured solar cells**, V. Badescu (Editor) Nova Science Publishers, New York, p. 1-41 (2010)
6. J.C. Goldschmidt, *Novel solar cell concepts*, München Verlag Dr. Hut, 280 pages (2010)
7. F. Creutzig and J.C. Goldschmidt (Editors), *Energie, Macht, Vernunft - Der umfassende Blick auf die Energiewende*, Taschenbuch ed. 2008, Shaker Media, Aachen, 352,(2008)

Publications in symposium proceedings and conferences

1. C. L. M. Hofmann, S. Fischer, C. Reitz, B. S. Richards, and J. C. Goldschmidt, "Comprehensive analysis of photonic effects on up-conversion of β -NaYF₄:Er³⁺ nanoparticles in an organic-inorganic hybrid 1D photonic crystal", in SPIE Photonics Europe. Photonics for Solar Energy Systems VI, **SPIE Proceedings** (SPIE, 2016), p. 98851A.
2. N. Tucher, J. Eisenlohr, P. Kiefel, H. Gebrewold, O. Höhn, H. Hauser, C. Müller, J. C. Goldschmidt, and B. Bläsi, "Efficient optical analysis of surface texture combinations for silicon solar cells", in SPIE Photonics Europe. Photonics for Solar Energy Systems VI, **SPIE Proceedings** (SPIE, 2016), p. 98980F.
3. B. Bläsi, N. Tucher, J. Eisenlohr, B. G. Lee, J. Benick, H. Hauser, M. Hermle, and J. C. Goldschmidt, "Rear side gratings for silicon solar cells: efficiency enhancement finally demonstrated", in SPIE Photonics Europe. Photonics for Solar Energy Systems VI, **SPIE Proceedings** (SPIE, 2016), p. 98980A.

4. N. Tucher, J. Eisenlohr, P. Kiefel, O. Höhn, H. Hauser, M. Peters, C. Müller, J. C. Goldschmidt, and B. Bläsi, *Optical properties of textured sheets: an efficient matrix-based modelling approach*, **Proceedings of SPIE** 2015, p. 96300G
5. M. F. Schumann, S. Wiesendanger, J.-C. Goldschmidt, K. Bittkau, U. W. Paetzold, A. Sprafke, R. B. Wehrspohn, C. Rockstuhl, and M. Wegener, *Cloaking of Metal Contacts on Solar Cells*, **OSA Technical Digest**, p. SW11.6.
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Invited talks and oral presentations

1. J. C. Goldschmidt, A. J. Bett, M. Bivour, M. Kohlstädt, S. Lee, S. Mastroianni, L. Mundt, M. Mundus, P. Ndione, C. Reichel, M. Schubert, P. Schulze, C. Veit, W. Veurman, K. Wienands, K. Winkler, U. Würfel, S. Glunz, and M. Hermle, "Towards High-Efficiency Perovskite Silicon Tandem Solar Cells", ICTMC20, 8th of September 2016, Halle, Germany. **Invited talk**
2. J. C. Goldschmidt, S. Fischer, B. Herter, and C. Hofmann, "Upconversion for Harvesting Sub-Bandgap Photons – From Materials to Devices", EMRS, 11th of May 2015, Lille, France. **Invited talk**
3. J. C. Goldschmidt, C. Hofmann, S. Fischer, and B. Herter, "Upconversion in Photonic Environments – Making Sub-Bandgap Photons Useful", DPG Spring Meeting, 27th of March 2015, Heidelberg, Germany.
4. J. C. Goldschmidt, "Record Efficient Upconverter Solar Cell Devices – Making Sub-Bandgap Photons Useful", 25th of February 2015, University of Pisa, Italy.
5. J. C. Goldschmidt, S. Fischer, B. Herter, E. Favilla, M. Tonelli, "Upconversion and Photonic Structures", EMN Meeting Photovoltaics, Orlando, USA, 14th of January, 2015. **Invited talk**
6. J. C. Goldschmidt, "Photonics for Light Trapping and Efficient Upconversion", Freiburg Institute of Advanced Studies, 2nd of December 2014, Albert-Ludwigs University, Freiburg, Germany.
7. J. C. Goldschmidt, S. Fischer, B. Herter, B. Fröhlich, K. W. Krämer, B. S. Richards, A. Ivaturi, S. K.W. MacDougall, J. Marques-Hueso, E. Favilla, M. Tonelli, "Record efficient upconverter solar cell devices", 29th European Photovoltaic Solar Energy Conference, 22nd of September 2014, Amsterdam, The Netherlands. **Plenary talk**
8. J. C. Goldschmidt, "Nanophotonics for High-Efficiency Silicon Solar Cells and Beyond" EUPVSEC parallel event: Nanophotonics: From Research to Driving Competitiveness in Solar Cells 24th of September 2014, Amsterdam, The Netherlands. **Invited talk**
9. J. C. Goldschmidt, S. Fischer, B. Herter, B. Fröhlich, K. W. Krämer, B. S. Richards, A. Ivaturi, S. K.W. MacDougall, J. Marques-Hueso, E. Favilla, M. Tonelli, "Record efficient upconverter solar cell devices", Progress In Electromagnetics Research Symposium, 26th of August 2014, Guangzhou, China. **Invited talk**
10. J.C. Goldschmidt, S. Fischer, B. Fröhlich, J. Gutmann, B. Herter, C. Hofmann, J. Löffler, F.C.J.M. van Veggel, S. Wolf, "Photon management with luminescent materials and photonic structures", SPIE Photonics Europe, 15th of April 2014, Brussels, Belgium. **Invited talk**
11. J.C. Goldschmidt, U. Aberhard, R. Capek, M. G. Debije, W. Evers, S. Fischer, B. Fröhlich, M. Hermle, B. Herter, A. Ivaturi, K. W. Krämer, E. Lifshitz, R. Martín-Rodríguez, S. K. MacDougall, A. Meijerink, E. Moulin, T. Müller, U. Paetzold, B. S. Richards, S. Wolf, M. Warzecha, C. Wouters, Y. Zhao, "Developing Efficient Upconverter Silicon Solar Cell Devices", OSA Topical Meeting Optical Nanostructures and Advanced Materials for Photovoltaics, 5th of November 2013, Tucson, USA.
12. J. C. Goldschmidt, S. Fischer, B. Fröhlich, A. Ivaturi, K. W. Krämer, B. S. Richards, A. Richter, M. Rüdiger, "Progress in Upconversion for Silicon Solar Cells", Workshop: High-efficiency materials for photovoltaics, Imperial College, 18th of July 2013, London, United Kingdom. **Invited talk**
13. J. C. Goldschmidt, J. Eisenlohr, S. Fischer, J. Gutmann, B. Fröhlich, B. Herter, J. Löffler, S. Wolf, "Photon Management with luminescent materials – and how we can improve it with photonic structures", University of Southampton, 24th of April 2013, Southampton, United Kingdom. **Invited talk**
14. J. C. Goldschmidt, J. Eisenlohr, S. Fischer, J. Gutmann, B. Fröhlich, B. Herter, J. Löffler, S. Wolf, "Photon Management with luminescent materials", Imperial College, 25th of March 2013, London, United Kingdom. **Invited talk**
15. J. C. Goldschmidt, B. Herter, S. Fischer, B. Fröhlich, S. Wolf, "Upconversion efficiency limits, and what we can expect realistically", the 25th Workshop on Quantum Solar Energy Conversion, 7th of March 2013, Bad Gastein, Austria.
16. J. C. Goldschmidt, S. Fischer, B. Herter, B. Fröhlich, S. Wolf, "Advanced upconverter systems – The Nanospec project", Workshop on advanced systems for photon management for photovoltaics, 21st of February 2013, Freiburg, Germany.
17. J. C. Goldschmidt, "The future role of photovoltaics in a global energy system", Potsdam Institute for Climate Impact Research (PIK), 24th of August 2012, Potsdam, Germany

18. J. C. Goldschmidt, S. Fischer, H. Steinkemper, B. Herter, T. Rist, S. Wolf, J. Frank, B. Fröhlich, B. Bläsi, F. Hallermann, G. von Plessen, K. W. Krämer, D. Biner, M. Hermle, "Increasing Upconversion Efficiency by Metal and Dielectric Nanostructures" ACPV Workshop, 20th of June 2012, Nesbru, Norway. **Invited talk**
19. J. C. Goldschmidt, S. Fischer, H. Steinkemper, B. Herter, T. Rist, S. Wolf, B. Bläsi, F. Hallermann, G. V. Plessen, K. W. Krämer, D. Biner, and M. Hermle, "Increasing upconversion by metal and dielectric nanostructures", SPIE 8256 Physics, Simulation, and Photonic Engineering of Photovoltaic Devices 2012, San Francisco, California, USA. **Invited talk**
20. J. C. Goldschmidt, S. Fischer, J. Gutmann, B. Herter, B. Bläsi, M. Hermle, "Photon Management with Luminescent Materials", Workshop „Next Generation Solar Energy“, 12th of November 2011, Erlangen, Germany. **Invited talk**
21. J. C. Goldschmidt, S. Fischer, H. Steinkemper, F. Hallermann, G. von Plessen, K. W. Krämer, D. Biner, M. Hermle, "Increasing Upconversion Efficiency by Plasmon Resonance in Metal Nano-Particles", 37th IEEE PVSC, 24th of June 2011, Seattle, USA. **Invited talk**
22. J. C. Goldschmidt, S. Fischer, P. Löper, K. W. Krämer, D. Biner, M. Hermle, and S. W. Glunz, "Upconversion to Enhance Silicon Solar Cell Efficiency - Detailed Experimental Analysis with Both Coherent Monochromatic Irradiation and White Light Illumination", 25th European Photovoltaic Solar Energy Conference and Exhibition 2010, Valencia, Spain.
23. J. C. Goldschmidt, M. Peters, J. Gutmann, L. Steidl, R. Zentel, B. Bläsi, M. Hermle, R. B. Wehrspohn, and A. Gombert, "Increasing Fluorescent Concentrator Light Collection Efficiency by Restricting the Angular Emission Characteristic of the Incorporated Luminescent Material - the "Nano-Fluko" Concept", SPIE 7725 Photonics For Solar Energy Systems III 2010, Brussels, Belgium.
24. J. C. Goldschmidt, M. Peters, F. Dimroth, A. W. Bett, L. Steidl, R. Zentel, M. Hermle, S. W. Glunz , and G. Willeke, "Developing large and efficient fluorescent concentrator systems", the 24th European Photovoltaic Solar Energy Conference 2009, Hamburg, Germany.
25. J. C. Goldschmidt, S. Fischer, P. Löper, M. Peters, L. Steidl, M. Hermle, and S. W. Glunz "Photon management with luminescent materials", the 21st Workshop on Quantum Solar Energy Conversion 2009, Rauris, Austria.
26. J. C. Goldschmidt "Neuartige Solarzellenkonzepte oder Wie man Photonen managt", 83. Stipendiatenseminar der Deutschen Bundesstiftung Umwelt, Deutsche Bundesstiftung Umwelt, Roggenburg, Germany, 9.–13.06.2008
27. J. C. Goldschmidt, M. Peters, P. Löper, O. Schultz, F. Dimroth, A. Bett, A. Gombert, S. W. Glunz , and G. Willeke, "Progress in photon management for full spectrum utilization with luminescent materials", the 20th Workshop on Quantum Solar Energy Conversion - (QUANTSOL 2008) 2008, Bad Gastein, Salzburg, Austria.
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