Dr.-Ing. Peter Heidebrecht
Scientific co-worker at the
Max Planck Institute Magdeburg
Germany

Publication list

Contributions to journals

[1] Heidebrecht, P., Sundmacher, K., *Dynamic Modelling and Simulation of a counter current Molten Carbonate Fuel Cell (MCFC) with Internal Reforming*, Fuel Cells No. 3-4, 2002, 166-180.

[2] Heidebrecht, P., Sundmacher, K., *Molten Carbonate Fuel Cells (MCFC) with Internal Reforming: Model-based Analysis of Cell Dynamics*, Chemical Engineering Science 58, 2003, 1029-1036.

[3] Mangold, M., Sheng, M., Heidebrecht, P., Kienle, A., Sundmacher, K., *Development of physical models for the process control of a molten carbonate fuel cell system*, Chemical Engineering Science 59, 2004, 4847-4852.

[4] Chudej, K., Heidebrecht, P., Petzet, V., Scherdel, S., Schittkowski, K., Pesch, H.J., Sundmacher, K., *Index Analysis and Numerical Solution of a Large Scale Nonlinear PDAE System Describing the Dynamical Behaviour of Molten Carbonate Fuel Cells*. Zeitschrift für Angewandte Mathematik und Mechanik 85, 2, 2005, 132-140.

[5] Heidebrecht, P., Sundmacher, K., *Conceptual design of the integration of the reforming process in high temperature fuel cells*, Journal of Power Sources 145, 1, 2005, 40-49.

[6] Pfafferodt, M., Heidebrecht, P., Stelter, M., Sundmacher, K., *Model-based prediction of suitable operating range of a SOFC for an Auxiliary Power Unit*, Journal of Power Sources 149, 2005, 53-62.

[7] Heidebrecht, P., Sundmacher, K., *Dynamic model of a cross-flow molten carbonate fuel cell with direct internal reforming (DIR-MCFC)*, Journal of the Electrochemical Society 152, 1, 2005, A2217-A2228.

[8] Heidebrecht, P., Sundmacher, K., *Optimisation of reforming catalyst distribution in a cross-flow molten carbonate fuel cell with direct internal reforming*, Industrial and Engineering Chemistry Research 44(10), 2005, 3522-3528.

[9] Gundermann, M., Heidebrecht, P., Sundmacher, K., *Validation of a mathematical model using an industrial MCFC plant*, Journal of Fuel Cell Science and Technology 3/3, 2006, 303-307.

[10] Heidebrecht, P. Galvita, V., Sundmacher, K. *An alternative method for parameter identification from Temperature Programmed Reduction (TPR) data*, Chemical Engineering Science 63, 2008, 4776-4788.

[11] Heidebrecht, P., Hertel, C., Sundmacher, K., *Conceptual Analysis of a Cyclic Water Gas Shift Reactor*, Int. Journal of Chemical Reaction Engineering 6, 2008, A19.

[12] Gundermann, M., Heidebrecht, P., Sundmacher, K., *Physically Motivated Reduction of a 2D Dynamic Model for Molten Carbonate Fuel Cells (MCFC)*, Fuel Cells 08, 2, 2008, 96-110.

[13] Gundermann, M., Heidebrecht, P., Sundmacher, K., *Parameter Identification of a Dynamic MCFC Model Using a Full-Scale Fuel Cell Plant*, Industrial and Engineering Chemistry Research 47, 2008, 2728-2741.

[14] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., Würtenberger, U., Bednarz, M., *Multi-scale Simulation of the Indirect Internal Reforming unit (IIR) in a Molten Carbonate Fuel Cell (MCFC)*, Industrial and Engineering Chemistry Research 47, 2008, 4332-4341.

Contributions to books

[1] Heidebrecht, P., Sundmacher, K., *Conceptual Design of Internal Reforming in High Temperature Fuel Cells*, in: Sundmacher, K., Kienle, A., Seidel-Morgenstern, A. (Editors), *Integrated Chemical Processes – Synthesis, Operation, Analysis and Control*, Wiley VCH, Weinheim, 2005, 45-67.

[2] Heidebrecht, P., *Modelling, Analysis and Optimisation of a Molten Carbonate Fuel Cell with Direct Internal Reforming (DIR-MCFC)*, Fortschritt-Berichte, VDI-Verlag, Düsseldorf, 2005, ISBN 3-18-382603-8.

[3] Heidebrecht, P., Sundmacher, K., *Efficient distributed power supply with Molten Carbonate Fuel Cells*, in: M. Graziani, P. Fornasiero (Editors), *Renewable Resources and Renewable Energy: A Global Challenge*, Taylor & Francis C.R.C. Press, 2006.

[4] Heidebrecht, P., Sundmacher, K., *MCFC Reference Model*, in: Sundmacher, K., Kienle, A., Pesch, H.J., Berndt, J.F., Huppmann, G. (Editors), *Molten Carbonate Fuel Cells – Modeling Analysis, Simulation, and Control*, Wiley VCH, Weinheim, 2007, 35-62.

[5] Heidebrecht, P., Gundermann, M., Sundmacher, K., *Steady State and Dynamic Process Analysis*, in: Sundmacher, K., Kienle, A., Pesch, H.J., Berndt, J.F., Huppmann, G. (Editors), *Molten Carbonate Fuel Cells – Modeling Analysis, Simulation, and Control*, Wiley VCH, Weinheim, 2007, 125-140.

[6] Heidebrecht, P., Sundmacher, K., *Conceptual Design and Reforming Concepts*, in: Sundmacher, K., Kienle, A., Pesch, H.J., Berndt, J.F., Huppmann, G. (Editors), *Molten Carbonate Fuel Cells – Modeling Analysis, Simulation, and Control*, Wiley VCH, Weinheim, 2007, 165-182.

[7] Heidebrecht, P., Sundmacher, K., *Optimisation of Reforming Catalyst Distribution*, in: Sundmacher, K., Kienle, A., Pesch, H.J., Berndt, J.F., Huppmann, G. (Editors), *Molten Carbonate Fuel Cells – Modeling Analysis, Simulation, and Control*, Wiley VCH, Weinheim, 2007, 211-220.

Contributions to conferences

[1] Heidebrecht, P., Sundmacher, K., *Integrierte Dampfreformierung und elektrochemische Wasserstoffoxidation in Schmelzcarbonatbrennstoffzellen* (Oral), Fachtreffen Reaktionstechnik, March 21-23, 2001, Weimar, Germany.

[2] Heidebrecht, P., Sundmacher, K., *Integration of Steam Reforming and Electrochemical Oxidation in a Molten Carbonate Fuel Cell (MCFC): Modelling and Analysis* (Poster), European Congress on Chemical Engineering - ECCE-3, June 26-28, 2001, Nürnberg, Germany.

[3] Heidebrecht, P., Sundmacher, K., *Molten Carbonate Fuel Cell (MCFC) with Internal Reforming: Model-based Analysis of Cell Dynamics* (Oral), ISCRE-17, August 25-28, 2002, Hongkong, China.

[4] Sundmacher, K., Heidebrecht, P., *Dynamic Simulation of Molten Carbonate Fuel Cells* (Oral), 53rd Annual Meeting of the Int. Society of Electrochemistry – ISE 2002, September 15-20, 2002, Düsseldorf, Germany.

[5] Gundermann, M., Heidebrecht, P., Sundmacher, K., Berndt, J., Koch, M., *Experimental Validation of a Mathematical Model for a MCFC Power Plant* (Oral), ACHEMA 2003, May 19–24, 2003, Frankfurt/M., Germany.

[6] Heidebrecht, P., Gundermann, M., Sundmacher, K., *Internal Steam Reforming in Molten Carbonate Fuel Cells* (Oral), DGMK conference on Innovation in the Manufacture and Use of Hydrogen, October 15-17, 2003, Dresden, Germany; appeared in: DGMK-Tagungsbericht 2003-2, 123-130.

[7] Pesch, H.J., Chudej, K., Petzet, V., Scherdel, S., Schittkowski, K., Heidebrecht, P., Sundmacher, K., *Numerical Simulation of a 1D Model of a Molten Carbonate Fuel Cell*, Proc. Appl. Math. Mech, 3, 2003, 521-522.

[8] Pesch, H.J., Chudej, K., Petzet, V., Scherdel, S., Schittkowski, K., Heidebrecht, P., Sundmacher, K., *Index Analysis of a Nonlinear PDAE System Describing a Molten Carbonate Fuel Cell*, Proc. Appl. Math. Mech 3, 2003, 563-564.

[9] Sundmacher, K., Mangold, M. and Heidebrecht, P., *Modellierung und Simulation von Schmelzcarbonat-Brennstoffzellen*, Seminar des IWE, Universität Karlsruhe, January 16, 2003, Karlsruhe, Germany.

[10] Mangold, M., Sheng, M., Heidebrecht, P., Kienle, A., Sundmacher, K., *Physical Model Development, Model Reduction, and Observer Design of a Molten Carbonate Fuel Cell*, ISCRE-18, June 6-9, 2004, Chicago, USA.

[11] Heidebrecht, P., Mangold, M., Kienle, A., Sundmacher, K., *Internal Reforming in High-Temperature Fuel Cells* (Oral), International Max Planck Symposium "Integrated Chemical Processes", March 22-24, 2004, Magdeburg, Germany.

[12] Heidebrecht, P., Sundmacher, K., *Development of a hierarchical model family for Molten Carbonate Fuel Cells with Direct Internal Reforming* (Oral), Programme of the ECMI 2004, June 21-25, 2004, Eindhoven, The Netherlands.

[13] Heidebrecht, P., Sundmacher, K., Gundermann, M., Mangold, M., Kienle, A., *Modeling, Simulation and Optimization of a Cross Flow Molten Carbonate Fuel Cell* (Oral), AIChE Annual Meeting, November 7-12, 2004, Austin, Texas, USA.

[14] Sundmacher, K., Heidebrecht, P., Gundermann, M., Mangold, M., Kienle, A., Koch, M., Berndt, J., *Operation and Analysis of MCFCs with Direct Internal Reforming*, International Centre for Science and High Technology of UNIDO (ICS-UNIDO), Expert Group Meeting “Technologies for hydrogen production and fuel cells”, March 7-8, 2005, Trieste, Italy.

[15] Gundermann, M., Heidebrecht, P., Sundmacher, K., J. Berndt, M. Koch, *Validierung eines Brennstoffzellenmodells an einer industriellen MCFC-Anlage* (Oral), Tagung der DECHEMA-Fachsektion "Reaktionstechnik", March 7-9, 2005, Bad Herrenalb, Germany.

[16] Heidebrecht, P., Sundmacher, K., *Gekoppelte Partielle Differentialgleichungen in Brennstoffzellenmodellen* (Oral), 76th Annual GAMM Conference, March 28 – April 1, 2005, Luxembourg.

[17] Heidebrecht, P., Mangold, M., Sundmacher, K., *Model-based Design and Control of Molten Carbonate Fuel Cells* (Oral), 7th European Symposium on Electrochemical Engineering, October 3-5, 2005, Toulouse, France.

[18] Heidebrecht, P., Galvita, V., Sundmacher, K., *CO-free hydrogen production in a two-step cyclic reactor* (Poster), 1st European Fuel Cell Technology and Applications Conference, December 14-16, 2005, Rome, Italy.

[19] Gundermann, M., Heidebrecht, P., Sundmacher, K., *Validation of a mathematical model using an industrial MCFC plant* (Oral), 1st European Fuel Cell Technology and Applications Conference, December 14-16, 2005, Rome, Italy.

[20] Mangold, M., Heidebrecht, P., Gundermann, M., Kienle, A. and Sundmacher, K., *Model Based Analysis and Control of an Industrial Molten Carbonate Fuel Cell Stack* (Oral), 3rd Sino-German-Workshop on Fuel Cells, May 1-4, 2005, Shanghai, China.

[21] Heidebrecht, P., Sundmacher, K., *Direkte Interne Reformierung in Hochtemperaturbrennstoff-zellen: Prozessintegration und konzeptionelles Systemdesign* (Oral), XXXIX. Jahrestreffen Deutscher Katalytiker, March 15-17, 2006, Weimar, Germany.

[22] Heidebrecht, P.. Gundermann, M., Sundmacher, K., *Validation of a 2D-MCFC model to an industrial plant* (Poster), 57th Annual meeting of The International Electrochemical Society, August 27 – September 1, 2006, Edinburgh, United Kingdom.

[23] Heidebrecht, P., Gundermann, M., Sundmacher, K., *Development of a validated reduced model for DIR-MCFC* (Poster), ISCRE-19, September 3-6, 2006, Potsdam, Germany.

[24] Heidebrecht, P., Gundermann, M., Sundmacher, K., *Optimierung von Betriebs- und Designparametern einer 300 kW Karbonatbrennstoffzelle (MCFC) mittels eines 2D-Prozessmodells* (Oral), GVC-Jahrestagungen 2006, September 26-28, 2006, Wiesbaden, Germany.

[25] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., Würtemberger, U., Bednarz, M., *Mehrskalige Modellierung der örtlichen Katalysatorstrukturierung eines indirekten internen Reformers einer Schmelzkarbonatbrennstoffzelle* (Poster), GVC-Jahrestagungen 2006, September 26-28, 2006, Wiesbaden, Germany.

[26] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., Würtemberger, U., Bednarz, M., *Multiscale Modelling of the Local Catalyst Structure in an Indirect Internal Reformer (IIR) of a Molten Carbonate Fuel Cell* (Poster), Fuel Cell Seminar, November 13-17, 2006, Honolulu, Hawaii, USA.

[27] Gundermann, M., Heidebrecht, P., Sundmacher, K., *Validation of a MCFC model to an industrial plant* (Poster), Fuel Cell Seminar, November 13-17, 2006, Honolulu, Hawaii, USA.

[28] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., *Mehrskalige CFD-Modellierung der örtlichen Katalysatorstrukturierung eines Indirekten Internen Reformers einer Schmelzkarbonatbrennstoffzelle* (oral), ProcessNet FA-Sitzung CFD, March 5-6, 2007, Würzburg, Germany.

[29] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., Würtemberger, U., Bednarz, M., *Multiscale CFD simulation of a methane steam reformer for optimization of the catalyst distribution* (Poster), ESCAPE 17, May 27-30, 2007, Bucharest, Romania.

[30] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., *3D simulation of a symmetric MCFC stack model* (Oral), CRE XI, August 26-31, 2007, Bilbao, Spain.

[31] Heidebrecht, P., Hertel, C., Sundmacher, K., *Model Based Analysis of a Cyclic Water Gas Shift Reactor* (Oral), CRE XI, August 26-31, 2007 , Bilbao, Spain.

[32] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., *Multi-scale modeling of the anode and cathode compartments and the IIR unit within a MCFC* (Oral), ECCE-6, September 16-21, 2007, Copenhagen, Denmark.

[33] Heidebrecht, P., Sundmacher, K., *Modellbasierte Analyse eines zyklischen Wassergas-shiftreaktors* (Poster), Jahrestreffen Reaktionstechnik, May 18-20, 2008, Würzburg, Germany.

[34] Adiche-Ait Aissa. C., Schultz, T., Heidebrecht, P., Sundmacher, K., *Continuous Mini-Channel Membrane Device for the Separation of Organic Mixtures: Experimental and Model-based Evaluation* (Oral), 1st SynTOP, June 11-13, 2008, Potsdam, Germany.

[35] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., *3D modelling of a symmetric Molten Carbonate Fuel Cell stack* (Oral), 18th CHISA, August 24-28, 2008, Prague, Czech Republic.

[36] Heidebrecht, P., Sundmacher, K., *Hydrogen Production by a Cyclic Water Gas Shift Reactor* (Oral), ISCRE 20, September 7-10, 2008, Kyoto, Japan.

[37] Heidebrecht, P., Rihko-Struckmann, L., Sundmacher, K., *Modellgestützter Entwurf eines zyklischen Wassergas-shiftreaktors zur Reinigung von Wasserstoff* (Oral), ProcessNet Jahrestagung 2008, October 7-9, 2008, Karlsruhe, Germany.

[38] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., *3D simulation of a symmetric MCFC stack model* (Oral), Fuel Cells Science & Technology, October 8-9, 2008, Copenhagen, Denmark.

[39] Pfafferodt, M., Heidebrecht, P., Sundmacher, K., *Symmetric Stack Model of a Molten Carbonate Fuel Cell (MCFC) with Indirect Reforming*(Oral), Comsol Conference, November 4-6, 2008, Hannover, Germany.

[40] Heidebrecht, P., Sundmacher, K., Schmelzkarbonatbrennstoffzellen (MCFC) mit interner Reformierung: modellgestützte mehrskalige Analyse (Oral), Sitzung der ProcessNet-Arbeitsausschüsse Elektrochemische Prozesse und Technische Reaktionen, January 20, 2009, Frankfurt (Main), Germany.

[41] Heidebrecht, P., Sundmacher, K., Biegler, L.T., *Optimal design of non-linear Temperature Programmed Reduction (TPR) experiments* (Oral), ESCAPE-19, June 14-17, 2009, Krakow, Poland, accepted.