

Publikationsliste

Journal Publikationen (mit Peer-Review)

- [1] A. Düll, J. Lehmann, **M. Börnhorst**, C. Ates, T. Häber, O. Deutschmann: Three-dimensional wave dynamics of falling film flows on structured surfaces, *Experiments in Fluids*, 66(4), 2025.
- [2] D. Sofialidis, J. Mutyal, R. Faltsi, M. Braun, **M. Börnhorst**, M. Esch: Efficient Modeling of SCR Urea Deposits Formation Using ANSYS Fluent, SAE Technical Paper, 2025-01-8485, 2025.
- [3] A. Düll, A. Cros-Le Lagadec, J. Buchmüller, T. Häber, C. Ates, **M. Börnhorst**: Intensifying interfacial oscillations in falling film flows over rectangular corrugations, *Physics of Fluids*, 36, 92107, 2024, DOI: 10.1063/5222760.
- [4] L. Eckendörfer, D. Rudolf, A. Brix, **M. Börnhorst**, H. Freund: Periodic Open Cellular Structures in Chemical Engineering: Application in Catalysis and Separation Processes, *Annual Review of Chemical and Biomolecular Engineering*, 15, 163-186, 2024, DOI: 10.1146/annurev-chembioeng-101121-085630.
- [5] O. Schumacher, C. Ates, **M. Börnhorst**, R. Koch, P. Stephan: Deposit formation from evaporating urea-water droplets on substrates of different wettability, *Journal of Colloid and Interface Science*, 634, 1-13, 2023, DOI: 10.1016/j.jcis.2022.1221.
- [6] C. Kuhn, A. Düll, P. Rohlfs, S. Tischer, **M. Börnhorst**, O. Deutschmann: Iron as recyclable energy carrier: Feasibility study and kinetic analysis of iron oxide reduction, *Applications in Energy and Combustion Science*, 12, 100096, 2022, DOI: 10.1016/j.jaecs.2022.100096.
- [7] A. Düll, P. Rohlfs, O. Deutschmann, **M. Börnhorst**: Performance Evaluation of KBH₄ as Energy Carrier for Shipping Applications, *Chemie Ingenieur Technik*, 94(5), 747-759, 2022, DOI: 10.1002/cite.202100193.
- [8] M. Eck, P. Lott, D. Schweigert, **M. Börnhorst**, O. Deutschmann: Spatially Resolved Measurements of HNCO Hydrolysis over SCR Catalysts, *Chemie Ingenieur Technik*, 94(5), 738-746, 2022, DOI: 10.1002/cite.202100192.
- [9] C. Kuntz, H. Weickenmeier, **M. Börnhorst**, O. Deutschmann: Deposition and decomposition of urea and its by-products on TiO₂ and VWT-SCR catalysts, *International Journal of Heat and Fluid Flow*, 95, 108969, 2022, DOI: 10.1016/j.ijheatfluidflow.2022.108969.
- [10] W. Shou, P. Rohlfs, **M. Börnhorst**, A. Schillaci, H. Marschall, O. Deutschmann, M. Wörner:

Bubble cutting by cylinder - elimination of wettability effects by separating liquid film, *Chemie Ingenieur Technik*, 94(3), 1-9, 2022, DOI: 10.1002/cite.202100145.

[11] M. Stein, V. Bykov, C. Kuntz, **M. Börnhorst**, O. Deutschmann, U. Maas: Modeling the decomposition of urea-water-solution in films and droplets under SCR conditions with chemistry in the liquid phase, *International Journal of Heat and Fluid Flow*, 94, 108936, 2022, DOI: 10.1016/j.ijheatfluidflow.2022.108936.

[12] C. Kuhn, D. Schweigert, C. Kuntz, **M. Börnhorst**: Single droplet impingement of urea water solution on heated porous surfaces, *International Journal of Heat and Mass Transfer*, 181, 121836, 2021, DOI: 10.1016/j.ijheatmasstransfer.2021.121836.

[13] **M. Börnhorst**, O. Deutschmann: Advances and challenges of ammonia delivery by urea-water sprays in SCR systems, *Progress in Energy and Combustion Science*, 87, 100949, 2021, DOI: 10.1016/j.pecs.2021.100949.

[14] C. Kuntz, C. Kuhn, H. Weickenmeier, S. Tischer, **M. Börnhorst**, O. Deutschmann: Kinetic modeling and simulation of high-temperature by-product formation from urea decomposition, *Chemical Engineering Science*, 246, 116876, 2021, DOI: 10.1016/j.ces.2021.116876.

[15] C. Ates, **M. Börnhorst**, R. Koch, M. Eck, O. Deutschmann, H.-J. Bauer: Morphological characterization of urea derived deposits in SCR systems, *Chemical Engineering Journal*, 409, 128230, 2021, DOI: 10.1016/j.cej.2020.128230.

[16] U. Budziankou, **M. Börnhorst**, C. Kuntz, O. Deutschmann, T. Lauer: Deposit formation from urea injection: A comprehensive modelling approach, *Emission Control Science and Technology*, 6(2), 211-227, 2020, DOI: 10.1007/s40825-020-00159-x.

[17] J. Dörnhöfer, **M. Börnhorst**, C. Ates, N. Samkhaniani, J. Pfeil, M. Wörner, R. Koch, H.-J. Bauer, O. Deutschmann, B. Frohnäpfel, T. Koch: A Holistic View on Urea Injection for NO_x Emission Control: Impingement, Re-atomization and Deposit Formation, *Emission Control Science and Technology*, 6(2), 228-243, 2020, DOI: 10.1007/s40825-019-00151-0.

[18] **M. Börnhorst**, C. Kuntz, S. Tischer, O. Deutschmann: Urea derived deposits in diesel exhaust gas after-treatment: Integration of urea decomposition kinetics into a CFD simulation, *Chemical Engineering Science*, 211, 115319, 2020, DOI: 10.1016/j.ces.2019.115319.

[19] D. Schweigert, B. Damson, H. Lüders, **M. Börnhorst**, O. Deutschmann: Heat transfer during

spray/wall interaction with urea water solution: an experimental parameter study, *International Journal of Heat and Fluid Flow*, 78, 108432, 2019, DOI: 10.1016/j.ijheatfluidflow.2019.108432.

[20] S. Tischer, **M. Börnhorst**, J. Amsler, G. Schoch, O. Deutschmann: Thermodynamics and reaction mechanism of urea decomposition, *Physical Chemistry Chemical Physics*, 21, 16785-16797, 2019, DOI: 10.1039/c9cp01529a.

[21] **M. Börnhorst**, X. Cai, M. Wörner, O. Deutschmann: Maximum Spreading of Urea Water Solution during Drop Impingement, *Chemical Engineering & Technology*, 42(11), 2419-2427, 2019, DOI: 10.1002/ceat.201800755.

[22] **M. Börnhorst**, S. Langheck, H. Weickenmeier, C. Dem, R. Suntz, O. Deutschmann: Characterization of solid deposits from urea water solution injected into a hot gas test rig, *Chemical Engineering Journal*, 377, 119855, 2019, DOI: 10.1016/j.cej.2018916.

[23] **M. Börnhorst**, O. Deutschmann: Single droplet impingement of urea water solution on a heated substrate, *International Journal of Heat and Fluid Flow*, 69, 55-61, 2018, DOI: 10.1016/j.ijheatfluidflow.2017.1007.

[24] **M. Börnhorst**, P. Walzel, A. Rahimi, A. Kharaghani, E. Tsotsas, N. Nestle, A. Besser, F. Kleine Jäger, T. Metzger: Influence of Pore Structure and Impregnation-drying Conditions on the Solid Distribution in Porous Support Materials, *Drying Technology Journal*, 34(16), 1964-1978, 2015, DOI: 10.1080/07373937.2016.1147048.

Aufsätze und Berichte

1. N. Kurig, B. Kreitz, E. Moioli, **M. Börnhorst**, J. Friedland: NaWuReT Colloquium: Veni, vidi, vici? Visionary leaders in chemical reaction engineering, Chemie Ingenieur Technik, angenommen, 2025.
2. B. Kreitz, **M. Börnhorst**, J. Friedland, E. Moioli: NaWuReT Colloquium: Career Pathways and Opportunities for Reaction Engineers in Industry, Chemie Ingenieur Technik, 96(6), 729-733, 2024, DOI: 10.1002/cite.202300182.
3. D. W. Agar, M. Bertau, **M. Börnhorst**, M. Busch, M. Casapu, P. Claus, K. Herrera Delgado, D. Demtröder, O. Deutschmann, R. Dittmeyer, et al.: Roadmap Chemical Reaction Engineering - An Initiative of the DECHEMA/VDI Subject Division Chemical Reaction Engineering, DECHEMA Gesellschaft für Chemische Technik und Biotechnologie e.V., ISBN 978-3-89746-243-4, 2023.
4. P. Naliwajko, J. Friedland, **M. Börnhorst**: NaWuReT and YounGeCatS Joint Summer School – Shaping a Green Future by Reaction Engineering and Catalysis, ChemCatChem, e202201548, 2023, DOI: 10.1002/cctc.202201548.
5. J. Friedland, **M. Börnhorst**, B. Kreitz, E. Moioli, G. Wehinger: NaWuReT Colloquium: From PhD Student to Assistant Professor – Early Career Chemical Engineers in Academia, Chemie Ingenieur Technik, 94(5), 629-633, 2022, DOI: 10.1002/cite.202100200.
6. B. Kreitz, P. Biessey, **M. Börnhorst**, V. Schallhart, T. Westermann: Trendbericht Technische Chemie, Nachrichten aus der Chemie, 70, 56-64, 2022, DOI: 10.1002/nadc.20224124649.
7. U. Budziankou, C. Kuntz, **M. Börnhorst**, T. Lauer: Untersuchungen zur Ablagerungsbildung und -zersetzung aus Harnstoff in SCR-Systemen, MTZ - Motortechnische Zeitschrift, 82, 66-70, 2021, DOI: 10.1007/s35146-020-0601-5.
8. **M. Börnhorst**, J. Friedland, B. Kreitz, E. Moioli, G. Wehinger: NaWuReT-Workshop: Forschung in der Reaktionstechnik für und mit der Gesellschaft?, Chemie Ingenieur Technik, 93(8), 1210-1213, 2021, DOI: 10.1002/cite.202100017.

Konferenzbeiträge: Vorträge

1. A. Düll, L. Kahouadji, **M. Börnhorst**, T. Häber, O. K. Matar, O. Deutschmann: Three-dimensional wave dynamics of falling film flows on structured surfaces, Bulletin of the American Physical Society, 77th Annual Meeting of the Division of Fluid Dynamics, Salt Lake City, USA, 2024.
2. A. Düll, A. Happ, A. Cros-Le Lagadec, **M. Börnhorst**, T. Häber, O. Deutschmann: Enhancement of liquid-side mass transfer in a falling film reactor by structure modification, International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS), Dresden, Deutschland, 2024.
3. A. Düll, A. Happ, A. Cros-Le Lagadec, **M. Börnhorst**, T. Häber, O. Deutschmann: Optimized surface structures for the intensification of CO₂ absorption in a falling film absorber, International Congress of Chemical and Process Engineering (CHISA), Prague, Tschechien, 2024.
4. A. Düll, **M. Börnhorst**, T. Häber, O. Deutschmann: Messtechnische Erfassung der dreidimensionalen Wellendynamik von Fallfilmströmungen auf strukturierten Oberflächen, Jahrestreffen der DECHEMA-Fachgruppe Mehrphasenströmungen, Bremen, Deutschland, 2024.
5. C. Kuhn, P. Rohlfs, A. Düll, S. Tischer, **M. Börnhorst**, O. Deutschmann: Iron as recyclable metal fuel: Reaction kinetic analysis of iron oxide reduction with hydrogen, Jahrestreffen der ProcessNet-Fachgruppe Reaktionstechnik, Würzburg, Deutschland, 2022.
6. **M. Börnhorst**, T. Homan, N. G. Deen, M. Wörner: Charakterisierung der Zerteilungsdynamik von Blasen an Zylindern, Jahrestreffen der ProcessNet-Fachgruppe Mehrphasenströmungen, Web-Event, 2022.
7. **M. Börnhorst**, M. Eck, D. Schweigert, O. Deutschmann: Spatially resolved measurement of simultaneous isocyanic acid hydrolysis and NO_x reduction on SCR catalysts, Jahrestreffen der ProcessNet-Fachgruppe Reaktionstechnik, Web-Event, 2021.
8. C. Kuntz, S. Tischer, **M. Börnhorst**, O. Deutschmann: Modeling urea deposit formation and decomposition on SCR catalysts, ECCOMAS Conference, European Community on Computational Methods in Applied Sciences, Web-Event, 2021.
9. S. Wang, P. Rohlfs, **M. Börnhorst**, A. Schillaci, H. Marschall, O. Deutschmann, M. Wörner: Validation of a Phase-Field Method for Cutting of a Rising Bubble by a Horizontal Cylinder,

Jahrestreffen der ProcessNet-Fachgruppe CFD, Frankfurt, Deutschland, 2019.

10. **M. Börnhorst**, C. Kuntz, S. Tischer, O. Deutschmann: Ammonia Preparation in the Tailpipe: Spray/Wall Interaction and Deposit Formation, Cross-Cut Lean Exhaust Emissions Reduction Simulations (CLEERS), Ann Arbor, USA, 2018.

11. **M. Börnhorst**, O. Deutschmann: Droplet/wall-interaction of aqueous urea solution on heated targets, Jahrestreffen der ProcessNet-Fachgruppe Mehrphasenströmungen und CFD, Bremen, Deutschland, 2018.

12. **M. Börnhorst**, P. Walzel, A. Rahimi, A. Kharaghani, E. Tsotsas, N. Nestle, A. Besser, F. Kleine Jäger, T. Metzger: Einfluss von Porenstruktur und Trocknungsbedingungen bei der Imprägnierung poröser Trägermaterialien, Jahrestreffen der ProcessNet-Fachgruppe Trocknungstechnik, Weimar, Deutschland, 2016.

13. **M. Börnhorst**, P. Walzel, F. Kleine Jäger, T. Metzger: Feststoffbildung bei der Trocknung einer Lösung in Mikromodellen, Jahrestreffen der ProcessNet-Fachgruppen Trocknungstechnik und Mechanische Flüssigkeitsabtrennung, Karlsruhe, Deutschland, 2015.

Konferenzbeiträge: Poster (Auswahl)

1. M. Gstettenbauer, J. Zeppenfeld, **M. Börnhorst**, H. Freund: Interaction of Solvent, Reactive Species and Surface in Heterogeneous Catalysis: Experiments and Modeling, Jahrestreffen der DECHEMA Fachgruppe „Chemische Reaktionstechnik“, Würzburg, Deutschland, 2024.
2. L. Nordhausen, M. Richter, **M. Börnhorst**: Adaption of a capillary sampling technique for spatially resolved concentration measurements in a SCR catalyst under real exhaust gas conditions, Jahrestreffen der DECHEMA Fachgruppe „Chemische Reaktionstechnik“, Würzburg, Deutschland, 2024.
3. **M. Börnhorst**, T. Homan, P. Rohlf, N. Deen, M. Wörner: Dynamics of bubble cutting by interaction with a solid cylinder, 4th International Symposium on Multiscale Multiphase Process Engineering, Berlin, Deutschland, 2022.
4. A. Düll, S. Rudolph, M. Hettel, **M. Börnhorst**: Influence of chemical reactions on the convective dissolution of CO₂ in a Hele-Shaw cell, Jahrestreffen der ProcessNet-Fachgruppe Reaktionstechnik, Würzburg, Deutschland, 2022.
5. C. Kuhn, **M. Börnhorst**, O. Deutschmann: Kinetic study of the oxidation and thermochemical reduction of iron and iron oxides, 743. WE-Heraeus-Seminar Process Integration, Chemical and Thermal Energy Storage for the Energy Transformation, Web-Event, 2021.
6. C. Kuntz, S. Tischer, **M. Börnhorst**, O. Deutschmann: Modeling urea deposit formation and decomposition on SCR catalysts, 743. WE-Heraeus-Seminar Process Integration, Chemical and Thermal Energy Storage for the Energy Transformation, Web-Event, 2021.
7. C. Kuhn, D. Schweigert, **M. Börnhorst**, O. Deutschmann: Single droplet impingement of urea water solution on heated porous and coated surfaces, Droplets, Web-Event, 2021.
8. C. Kuhn, D. Schweigert, **M. Börnhorst**, O. Deutschmann: Single droplet impingement of urea water solution on heated porous surfaces, Jahrestreffen der DECHEMA Fachgruppen „Mehrphasenströmung“ und „CFD“, Paderborn, Germany, 2021.
9. U. Budziankou, **M. Börnhorst**, C. Kuntz, O. Deutschmann, T. Lauer: Deposit formation from urea injection: A comprehensive modelling approach, International Symposium on Modeling of Exhaust-Gas After-Treatment (MODEGAT), Bad Herrenalb, Deutschland, 2019.
10. **M. Börnhorst**, J. Dörnhöfer, C. Ates, N. Samkhaniani, J. Pfeil, M. Wörner, R. Koch, H.-J. Bauer, O. Deutschmann, B. Frohnäpfel, T. Koch: A Holistic View on Urea Injection for NO_x

Emission Control: Impingement, Re-atomization and Deposit Formation, International Symposium on Modeling of Exhaust-Gas After-Treatment (MODEGAT), Bad Herrenalb, Deutschland, 2019.

11. **M. Börnhorst**, T. Homan, P. Rohlf, N. Deen, O. Deutschmann, M. Wörner: Cutting of rising bubbles by a wire without contact, Jahrestreffen der DECHEMA Fachgruppen „Reaktionstechnik“ und „Mehrphasenströmung“, Würzburg, Deutschland, 2019.

12. **M. Börnhorst**, C. Kuntz, S. Tischer, O. Deutschmann: Kinetic Analysis and Modeling of Urea Decomposition in Exhaust Gas Aftertreatment Systems, 11th International Congress on Catalysis and Automotive Pollution Control (CAPoC), Brüssel, Belgien, 2018.

13. **M. Börnhorst**, A. Bertótiné Abai, S. Tischer, O. Deutschmann: Kinetic Analysis and Modeling of Evaporation and Urea Decomposition Processes in Exhaust Gas Aftertreatment Systems, International Symposium on Chemical Reaction Engineering, Florenz, Italien, 2018.

14. **M. Börnhorst**, T. Häber, R. Suntz, O. Deutschmann: Spray/Wand-Interaktion und Wärmeübergang in Harnstoff-SCR Systemen, Jahrestreffen der DECHEMA Fachgruppe „Wärme- und Stofftransport“, Bruchsal, Deutschland, 2017.

15. A. Bertótiné Abai, **M. Börnhorst**, S. Tischer, O. Deutschmann: Modeling of Interface-Reactions in Urea-SCR System, International Symposium on Modeling of Exhaust-Gas After-Treatment (MODEGAT), Bad Herrenalb, Deutschland, 2017.

16. **M. Börnhorst**, T. Häber, R. Suntz, O. Deutschmann: Spray/wall interaction and heat transfer in urea SCR systems, International Symposium on Modeling of Exhaust-Gas After-Treatment (MODEGAT), Bad Herrenalb, Deutschland, 2017.

17. **M. Börnhorst**, C. Dem, O. Deutschmann: Experimental Studies on Deposit Formation in Urea-SCR Systems, International Combustion Institute Summer School on Near-Wall Reactive Flows, Bensheim, Deutschland, 2016.

18. **M. Börnhorst**, A. Bertótiné Abai, G. Schoch, O. Deutschmann: Analysis and Modeling of Deposit Formation and Decomposition in Urea-SCR Systems, Jahrestreffen der DECHEMA Fachgruppe „Reaktionstechnik“, Würzburg, Deutschland, 2016.

Eingeladene Vorträge

1. **M. Börnhorst**: Multiphase Reactors in Emission Control, CRC 1615 SMART Reactors Seminar Series, TU Hamburg, Hamburg, Deutschland, 2024.
2. **M. Börnhorst**: Modeling Multiphase Urea Decomposition in SCR Systems, CHASS Colloquium (EU project: Cu-CHA zeolite-based catalysts for the selective catalytic reduction of NO_x in exhaust diesel gas: addressing the issue of Sulfur Stability), TU Darmstadt, Darmstadt, Deutschland, 2024.
3. **M. Börnhorst**: Heterogeneous catalysis in emission control: Multiphase flow and reaction kinetics, International Combustion Institute Summerschool on Near-Wall Reactive Flows, Darmstadt, Deutschland, 2024.
4. **M. Börnhorst**, U. Würth, O. Deutschmann: Spray/Wall Interaction in the Exhaust Line of Diesel-propelled Vehicles: Temperature and Heat Transfer Effects, InfraTec Thermography User Conference, Stuttgart, Deutschland, 2018.
5. **M. Börnhorst**, O. Deutschmann: Spray/wall-interaction and deposit formation in ammonia selective catalytic reduction systems, International Combustion Institute Summerschool on Near-Wall Reactive Flows, Darmstadt, Deutschland, 2017.