

CURRICULUM VITAE

ALEX C. HOFFMANN

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PERSONAL

- Nationality: Danish
- Present position: Full Professor at the Dept. of Physics and Technology, University of Bergen.

CAREER SUMMARY

More than 25 years of industrial and academic experience in research and development, consultation and teaching within the field of Chemical Engineering. Expertise in transport phenomena and thermodynamics, specifically in technology involving multiphase systems. Focus on cross-disciplinary research for industry (mainly energy) applying micro- and nanoscale modeling to processes involving multiphase systems in cooperation with mathematicians, chemists and physicists.

PRESENT AND PAST EXPERIENCE

- 01/2001–present Full professor at the University of Bergen, responsible for specialization in Multiphase Systems within the group Theoretical Physics and Energy Physics in the Department of Physics and Technology. The present staff of the group: 2 full professors, one part-time assoc. professor, 4 PhD students and 9 master students.
- 01/1987–12/2000 Assistant, from 1992 associate, professor at the Dept of Chem. Eng., University of Groningen, the Netherlands. *Research:* Particle and dispersed phase technology, (computational) fluid dynamics. *Teaching:* A number of courses in fundamental and applied thermodynamics and transport phenomena. *Administration:* Study coordinator for the Department. Served on planning committees for education reforms.
- 01/1984–01/1987 Research associate and consultant at SPS Harwell, UK, detached from the University of Surrey. Was responsible for the SPS cyclone research program, reporting to the sponsoring industries. Consultant in gas cleaning. Made the safety case for, and commissioned, an industrial scale experimental rig.
- 03/1978–03/1979 Engineer at UOP, Chicago, USA. Operated oil refining pilot plants. Researched processes for recovering heavy metals from oil residues. Characterized foaming problems in a catalytic cracking process.

DEGREES AND PROFESSIONAL QUALIFICATIONS

1980	B.Sc. (Hons. 2:1), Chemical Engineering, University of the South Bank. Specialization: electrochemistry
1983	Ph.D. Chemical Engineering, Ramsay Memorial Laboratory for Chemical Engineering, UCL, University of London. Thesis: "Gas Fluidization at Elevated Pressures".
1985	Chartered Engineer, CEng.

TEACHING

- Assistant on: "FORTRAN" Dept. of Chem. Eng., UCL
 - Assistant on: "Chem. Engng. Laboratory", Dept. of Chem. Eng., UCL
 - Assistant on: "Physical Transport Phenomena" Dept. of Chemical Engineering, Univ. of Groningen
 - "Applied Thermodynamics" Dept. of Chemistry, Univ. of Groningen (elected "lecturer of the year" for this course by the students)
 - "Physical Chemistry" Dept. of Pharmacy, Univ. of Groningen
 - "Thermodynamics" Dept. of Chemical Engineering, Univ. of Groningen
 - "Chem. Engng. Laboratory", Dept. of Chem. Eng., Univ. of Groningen
 - "Fluid Flow and Heat Transfer", Dept. of Phys. and Technol., Univ. of Bergen
 - "Introduction to Multiphase Systems", Dept. of Phys. and Technol., Univ. of Bergen
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MEMBERSHIPS, AWARDS

Member of the European Academy of Sciences (*MAE*)

Member of the Norwegian Academy of Technological Sciences (*MNTVA*)

Recipient of the President's Award, Shell Global Solutions

Fellow of The British Institution of Chemical Engineers (*FIChemE*)

Chartered Engineer (*CEng*)

Chartered Scientist (*CSci*)

Invited member of the international panel of experts for the Russian Science Foundation.

Recipient of around 25 research awards from industry and public funding bodies.

10 year served as elected member of the Organizing and Governing Committee for the "Gas Conference in Bergen" for policy makers and industrialists.

PUBLICATIONS

Books

- 1 Hoffmann, A.C. *Gas fluidization at Elevated Pressures* Ph.D. Thesis, Ramsay Memorial Laboratory of Chemical Engineering, University of London (1983).
- 2 Hoffmann, A.C. and Stein, L.E., *Gas Cyclones and Swirl Tubes—Principles, Design and Operation* Springer Verlag, Berlin, Heidelberg, New York (2002) ISBN 3-540-43326-0. 328 pp.
- 3 Translation to Chinese of Hoffmann, A.C. and Stein, L.E., *Gas Cyclones and Swirl Tubes—Principles, Design and Operation* Translation: W. Peng and Z. Ji, Chemical Industry Press, Beijing (2004) ISBN 7-5025-5871-3.

- 4 Dehling, H.G., Gottschalk, T. and Hoffmann, A.C. *Stochastic Modeling in Process Technology* Elsevier Science, London (2007) ISBN 978-0444520265, 279 pp.
- 5 Hoffmann, A.C. and Stein, L.E., *Gas Cyclones and Swirl Tubes—Principles, Design and Operation* 2nd, Extended Edition, Springer Verlag, Berlin, Heidelberg, New York (2007) ISBN 978-3-540-74694-2. 426 pp.
- 6 Hoffmann, A.C. *Stochastic Modeling Techniques in Powder Technology* Chapter in “Powder Engineering, Technology and Applications” Jason M. Barker (Ed.) Nova Publishers (2010). ISBN: 978-1-61761-424-8. 46 pp.

Refereed Articles¹

- 1 Rowe, P.N., Foscolo, P.U., Hoffmann, A.C. and Yates, J.G., “Fine powders fluidized at low velocity at pressures up to 20 bar with gases of different viscosity” *Chem. Eng. Sci.* **37** (1982), 1115–1117.
- 2 Rowe, P.N., Foscolo, P.U., Hoffmann, A.C. and Yates, J.G., “X-ray observation of gas fluidized beds under pressure” in: “Fluidization”, Kunii, D. and Toei, R. (eds.) *Proceedings of the 4th international conference on fluidization*, Kashikojima, Japan, 1983.
- 3 Hoffmann, A.C. and Yates, J.G. “Experimental observations of fluidized beds at elevated pressures” *Chem. Eng. Commun.* **41** (1986). 133–149.
- 4 Hoffmann, A.C. “Modellen voor het voorspellen van het scheidingsvermogen van cyclonen” (“Models for Predicting the Separation Efficiency of Cyclones”) *I² Procestechologie* **11** (1989).
- 5 Janssen, L.P.B.M., Prins, J., Hoffmann, A.C., de Meijer, R.J and Veen, A.W.L. “Modeling the migration of contaminants in soil” *Chem. Eng. Commun.* **89** (1990), 37–48.
- 6 Hoffmann, A.C. and Paarhuis, H. “A study of the particle residence time distribution in vertically moving fluidized beds” *IChemE Symp. Ser.* **121** (1990), 37–49.
- 7 Clift, R., Ghadiri, M. and Hoffmann, A.C. “A critique of two models for cyclone performance”, *AIChE Journal* **37** (1991), 285–289.
- 8 Hoffmann, A.C. and Romp, E.J. “Segregation in a fluidized powder of a continuous size distribution”, *Powder Technol.* **66** (1991), 119–126.
- 9 Hoffmann, A.C., Arends, H. and Sie, H. “An experimental investigation elucidating the effect of solid loading on cyclone performance” *Filtration and Separation* **28** (1991), 188–193.
- 10 Hoffmann, A.C. and Grommers, H.E. “Aspects of the numerical modeling of the flowpattern in gas cyclones”, *Proceedings Filtech Europa '91*, Karlsruhe, October 1991, 569–582.
- 11 Hoffmann, A.C., van Santen, A., Allen, R.W.K. and Clift, R. “Effects of geometry and solid loading on the performance of gas cyclones” *Powder Technol.* **70** (1992), 83–91.
- 12 Hoffmann, A.C., Janssen, L.P.B.M and Prins, J. “Particle segregation in fluidized binary mixtures” *Chem. Eng. Sci.* **48** (1993), 1583–1592.
- 13 Hartholt, G.P., Hoffmann, A.C., Janssen, L.P.B.M, Hoogstraten, H.W. and Moes, J.H. “Finite element calculations of flow past a spherical bubble rising on the axis of a cylindrical tube” *ZAMP* **45** (1994), 733–745.
- 14 Hoffmann, A.C, Hartholt, G.P. and Yates, J.G. “On the rheology of the dense phase of a gas fluidized bed” *Chem. Eng. Commun.* **130** (1994), 31–44.
- 15 Marring, E., Hoffmann, A.C. and Janssen, L.P.B.M. “The effect of vibration on the fluidization behaviour of some cohesive powders” *Powder Technol.* **79** (1994), 1–10.
- 16 Hoffmann, A.C., Finkers, H.J. and Seegers, J.A. “Predicting the behaviour of industrial powders in precision handling equipment” *Proceedings of the 1. International Particle Technology Forum* Denver, Colorado, August 17-19, 1994.

¹Precise record in the ISI database: AU=(hoffmann ac OR hoffman ac) AND AD=(groningen OR bergen OR london OR harwell)

- 17 Hartholt, G.P., Hoffmann, A.C. and Janssen, L.P.B.M. "Visual observation of individual particles in fluidized beds" *Proceedings of the 1. International Particle Technology Forum* Denver, Colorado, August 17-19, 1994.
- 18 Hoffmann, A.C. and van den Bogaard, H.A. "A numerical investigation of bubbles rising at intermediate reynolds and large weber numbers" *Ind. Eng. Chem. Res.* **34** (1995), 366–372.
- 19 Hoffmann, A.C. and Finkers, H.J. "A relation for the void fraction of randomly packed particle beds" *Powder Technol.* **82** (1995), 197–203.
- 20 Hartholt, G.P., Hoffmann, A.C. and Janssen, L.P.B.M. "The influence of the gas relative humidity on the mixing and segregation in gas-solid fluidized beds" *Proceedings of the 1995 IChemE Research Event/First European Conference*, Edinburgh, Jan. 1995, Chameleon Press, London, p.862–864.
- 21 Hartholt, G.P., Hoffmann, A.C., Kamphuis, A.J. and Janssen, L.P.B.M. "Avoiding demixing and defluidisation in gas fluidized bed reactors" *Proceedings of the 1995 AIChE Annual Meeting*, Miami, Florida, Nov 12–17, 1995.
- 22 Marring, E., Hoffmann, A.C. and Janssen, L.P.B.M. "A study of the discharge of cohesive powders under simultaneous aeration and vibration" *Particulate Science and Technology* **13** (1995), 7–21.
- 23 Hartholt, G.P., R. la Rivière, Hoffmann, A.C. and Janssen, L.P.B.M "Separating solids from a mixture in a gas-solid fluidized bed" *International patent application PCT/NL95/00243* submitted by Verenigde Octrooibureaux, Groningen, Den Haag July, 1995.
- 24 Hoffmann, A.C., de Jonge, R., Arends, H. and Hanrats, C. "Evidence of the 'natural vortex length' and its effect on the separation efficiency of gas cyclones" *Filtration and Separation* **32** (1995), 799–804.
- 25 Hartholt, G.P., Hoffmann, A.C. and Janssen, L.P.B.M. "Visual observation of individual particle behaviour in gas and liquid fluidized beds" *Powder Technol.* **88** (1996), 341–345.
- 26 Meetsma, W.A., Hoffmann, A.C. and Cox, E.L. "Gravity-driven thickening in a long, vertical tube" *Chem. Eng. Sci.* **51** (1996), 4279–4288.
- 27 la Rivière, R., Hartholt, G.P., Hoffmann, A.C. and Janssen, L.P.B.M. "Methods for the determination of particle residence time distribution in continuous gas fluidized beds" *IChemE Symp. Ser.* **140** (1996), 283–294.
- 28 Hoffmann, A.C., de Groot, M. and Hospers, A. "The effect of the dust collection system on the flowpattern and separation efficiency of a gas cyclone" *Can. J. Chem. Eng.* **74** (1996), 464–470.
- 29 Hartholt, G.P., Hoffmann, A.C., Kamphuis, A.J. and Janssen, L.P.B.M. "Avoiding demixing and defluidisation in gas fluidized bed reactors" *AIChE Symp. Ser.* **92** (1996), 15–19.
- 30 Hoffmann, A.C., Finkers, H.J. and Seegers, J.A. "Relations between particle and bulk properties for some industrial powders" *Part. Part. Syst. Charact.* **13** (1996), 354–361.
- 31 Ray, M.B., Tien, C., Hoffmann, A.C. and Beumer, M.I.L., "Numerical simulation of the swirl flow pattern and collection efficiencies in gas-solid separators" *Proceedings of the Asia-Pacific Conference on Sustainable Energy and Environmental Technology* Singapore, June 1996, 290–297.
- 32 Jonker, G. H., Hoffmann, A.C. and Beenackers, A.A.C.M. "Classification mechanism of the chute, a liquid-phase remover of fines in the micron range from a batch of porous particles" *Powder Technol.* **90** (1997), 251–258.
- 33 Ray, M.B., Luning, P.E., Hoffmann, A.C., Plomp, A. and Beumer, M.I.L. "Post cyclone (PoC); an innovative way to reduce the emission of fines from industrial cyclones" *Ind. Eng. Chem. Res.* **36** (1997), 2766–2774.
- 34 Hartholt, G.P., la Rivière, R., Hoffmann, A.C. and Janssen, L.P.B.M "The influence of perforated baffles on the mixing and segregation of a binary group B mixture in a gas-solid fluidized bed" *Powder Technol.* **93** (1997), 185–188.

- 35 Hoogstraten, H.W., Rass, W.B., Hartholt, G.P. and Hoffmann, A.C. "A numerical study of the flow past a spherical cap bubble rising in a fluidized bed" *Ind. Eng. Chem. Res.* **37** (1998), 247–252.
- 36 Janssen, L.P.B.M., Marring, E., Hoogerbrugge, J.C. and Hoffmann, A.C. "The mechanical behaviour of vibrated, aerated beds of glass and starch powder" *Chem. Eng. Sci.* **53** (1998), 761–772.
- 37 Finkers, H.J. and Hoffmann, A.C., "Using a 'structural ratio' for predicting the fractional voidage of binary particle mixtures" *AIChE Journal* **44** (1998), 495–497.
- 38 Ray, M.B., Luning, P.E., Hoffmann, A.C., Plomp, A. and Beumer, M.I.L., "Improving the efficiency of industrial scale cyclones for particles less than five micron" *Int. J. Miner. Process.* **53** (1998), 39–47.
- 39 Hoffmann, A.C., Postma, R., Plomp, A. and Ray, M.B. "Comparison of different analytical methods in predicting the efficiency of gas-solid separators" *Proceedings PARTEC 98, 4. European Symposium Separation of Particles from Gases*, F. Ebert (ed.) Nürnberg, March 1998, 35–44.
- 40 Schaafsma, S.H, Hoffmann, A.C., Blauw, L., Vonk, P. and Kossen, N.W.F. "Influence of liquid distribution on the fluid bed agglomeration process" *Proceedings PARTEC 98, 1. European Symposium Process Technology in Pharmaceutical and Nutritional Sciences*, H. Leuenberger (ed.), Nürnberg, March 1998, 100–109 .
- 41 Wensink, E.J.W., Hoffmann, A.C. and Apol, M.E.F. "The effect of adsorbed moisture on interparticle forces, investigated by means of MD simulations" *Proceedings of the World Conference on Particle Technology 3*, Brighton, UK, July 1998.
- 42 Hoffmann, A.C. and Dehling, H.G. "A stochastic modeling approach to particle residence time distribution in continuous fluidized beds" *Proceedings of the World Conference on Particle Technology 3*, Brighton, UK, July 1998.
- 43 Snieders, F., Hoffmann, A.C., Yates, J.G. and Cheesman, D. "Experimental investigation of the behaviour of coarse particles in an interconnected fluidized bed" *Proceedings of the World Conference on Particle Technology 3*, Brighton, UK, July 1998.
- 44 Postma, R., Hoffmann, A.C., Dries, H.W.A. and Williams, C.P. "The use of swirl tubes for dedusting" *Proceedings of the World Conference on Particle Technology 3*, Brighton, UK, July 1998.
- 45 Dijk, van J.-J., Hoffmann, A.C., Cheesman, D. and Yates, J.G, "The influence of horizontal internals on the flowpattern in dense fluidized beds. An X-ray investigation." *Powder Technol.* **98** (1998), 273–278.
- 46 Snieders, F.F., Hoffmann, A.C., Cheesman, D., Yates, J.G., Stein, M. and Seville, J.P.K. "The dynamics of large particles in a four-compartment interconnected fluidized bed" *Powder Technol.* **101** (1999), 229–239.
- 47 Hoffmann, A.C. and Kevelam, J. "A model for the interparticle surface separation in concentrated mono- and polydisperse suspensions" *AIChE Journal* **45** (1999), 285–290.
- 48 de Jong, J.A.H., Hoffmann, A.C. and Finkers H.J. "Powder flowability in practice: a review and discussion" *Chem. Eng. Progress* **95** No4 (1999) 25–33.
- 49 Schaafsma, S., Kossen, N.W.F., Mos, M.T., Blauw, L. and Hoffmann, A.C. "Effects and control of humidity and particle mixing in fluid-bed granulation" *AIChE Journal* **45** (1999), 1202–1210.
- 50 Kevelam, J., Hoffmann, A.C., Engberts, J.B.F.N., Blokzijl, W., Pas, J. van de, Verluis, P. "Rheology of concentrated dispersions of sterically-stabilized polydisperse lamellar droplets" *Langmuir* **15** (1999), 5002–5013.
- 51 Dries, H.W., Geiger, F.J. , Bekink, S.J., Postma, R.S. and Hoffmann A.C. "Hot flue gas clean up with the upgraded shell third stage separator" *Proceedings of CFB-6, 6th International Conference on Circulating Fluidized Beds*, August 22–27, 1999, Würzburg, Germany.
- 52 Dehling, H.G., Hoffmann, A.C. and Stuu, H.W. "Stochastic models for transport in a fluidized bed" *SIAM J. Appl. Math.* **60** (1999), 337–358.

- 53 Hoffmann A.C., Berrino, A. and Ray, M.B. "On the shape of grade efficiency curves computed for centrifugal dedusters by CFD with Lagrangian particle tracking" *AIChE Symp. Ser.* **95** No321 (1999), 13–17.
- 54 Ray, M.B., Hoffmann, A.C. and Postma, R.S. "Performance of different analytical methods in evaluating grade efficiency of centrifugal separators" *J. Aerosol Sci* **31** (2000), 563–581.
- 55 Hoffmann, A.C. "Manipulating Fluidized Beds by using Internals: Fluidization with baffles" *NPT Procestechologie*, **7** No 2 (2000), 20–24.
- 56 Dechsiri, C., Abanades, J.C., Dehling, H.G., Hoffmann, A.C. and Wright, P.C. "A stochastic model for mixing and segregation in slugging fluidized beds" *Récents Progrès en Génie des Procédés* No 75 vol 14 (2000), *Proceedings of the 3rd European Conference on Fluidization*, Toulouse, May 2000, 631–641.
- 57 Wensink, E.J.W., Hoffmann, A.C., Apol, M.E.F. and Berendsen H.J.C. "Properties of adsorbed water layers and the effect of adsorbed layers on interparticle forces" *Langmuir* **16** (2000), 7392–7400.
- 58 Cioffi, M., Janssen, L.P.B.M. and Hoffmann, A.C. "Reducing the gel effect in free radical polymerization" *Chem. Eng. Sci.* **56** (2001), 911–915.
- 59 Dechsiri, C., Bosma, J.C., Hoffmann, A.C., Hui, G. and Dehling, H.G. "A stochastic model for particle mixing and segregation in fluidized beds with baffles" *Proceedings PARTEC 2001 International Congress for Particle Technology*, Nürnberg, March 2001.
- 60 Peng, W., Hoffmann, A. C., Boot, P., Udding, A., Dries, H.W.A. and Kater, J. "Determining the best modeling assumptions for cyclones and swirl tubes by CFD and LDA" *Proceedings PARTEC 2001 International Congress for Particle Technology*, Nürnberg, March 2001.
- 61 Cioffi, M., Hoffmann, A.C. and Janssen, L.P.B.M. "Rheokinetics and the influence of shear rate on the Trommsdorff (gel) effect during free radical polymerization" *Polymer Eng. and Sci.* **41** (2001), 595–602.
- 62 Cioffi, M., Janssen, L.P.B.M. and Hoffmann, A.C. "Instabilities in free radical polymerization" *Nonlinear Analysis* **47** (2001), 897–906.
- 63 Hoffmann, A.C., de Groot, M. Peng, W., Dries, H.W.A. and Kater, J. "Advantages and risks in increasing cyclone separator length" *AIChE Journal* **47** (2001), 2452–2460.
- 64 Peng W., Boot, P.J.A.J., Hoffmann A.C., Dries, H.W.A., Kater, J., Ekker, A. "Flow in the inlet region in tangential inlet cyclones" *Ind. Eng. Chem. Res.* **40** (2001), 5649–5655.
- 65 Reuvekamp, R.J., Ray, M.B. and Hoffmann, A.C. "Deposition of a fine powder in horizontal pipelines and bends" *Chem Eng Comm.* **189** (2002), 849–864.
- 66 Dechsiri C., van der Zwan E., Bosma, J.C, Paans A.M.J. and Hoffmann A.C. "Positron emission tomography (PET) for fluidization" *Proceedings WCPT4, the Fourth World Congress on Particle Technology*, Sydney, 2002.
- 67 Dechsiri C., Dehling H.G. and Hoffmann A.C. "Stochastic model for fluidization" *Proceedings WCPT4, the Fourth World Congress on Particle Technology*, Sydney, 2002.
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- 69 Apol, M.E.F. Berendsen, H.J.C. Mark, A.E. and Hoffmann A. C. "Interparticle forces for DEM by MD simulations" *Proceedings WCPT4, the Fourth World Congress on Particle Technology*, Sydney, 2002.
- 70 Bosma, J.C. Hoffmann, A.C. "Feasibility study of particle classification in fluidized beds with internal baffles" *Proceedings WCPT4, the Fourth World Congress on Particle Technology*, Sydney, 2002.

- 71 Peng, W., Hoffmann, A.C. Boot, P., Udding, A., Dries, H.W.A., Ekker, A. and Kater, J. "Flowpattern in reverse-flow centrifugal separators" *Powder Technol.* **127** (2002), 212–222.
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- 76 Dechsiri, C., van de Wiel, F., Dehling, H.G., Paans, A.M.J. and Hoffmann, A.C. "Positron Emission Tomography Applied to Fluidization Engineering" *Proceedings of the 3rd World Conference on Industrial Process Tomography* Banff, Canada, Sept. 2003. Keynote paper.
- 77 Hoffmann, A.C., Dechsiri, C., van de Wiel, F., Ghione, A., Dehling, H.G., Paans, A.M.J. "Tracking Individual Particles in a Fluidized Bed using a Medical PET-Camera" *Proceedings of the 3rd World Conference on Industrial Process Tomography* Banff, Canada, Sept. 2003.
- 78 Dewitz, T.S., Sanborn, R.A., Dries, H.W.A., Ekker, A.A., Kater, J., Peng, W. and Hoffmann, A.C. "Cyclone separator with a vortex extender pin (swirl tube separator)" *International Patent Application 13765636.0-2316-US0322294* Shell Internationale Research Maatschappij B.V. (2003).
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- 80 Peng, W., Hoffmann, A.C. and Dries H. "The separation characteristics of swirl tube dust separators" *AIChE Journal* **50** (2004), 87–96.
- 81 Dechsiri, C., van der Zwan, E.A., Dehling H.G. and Hoffmann A.C. "The Dispersion of Particle Pulses in Fluidized Beds Measured by PET" *AIChE Journal* **51** (2005), 791–801.
- 82 Hoffmann, A.C., Dechsiri, C., van de Wiel, F. and Dehling, H.G. "PET investigation of a fluidized particle: Spatial and temporal resolution and short term motion" *Meas. Sci. Technol.* **16** (2005), 851–858.
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- 87 Peng, W., Hoffmann, A.C., Dries, H.W.A., Regelink, M.A. and Stein, L.E. "Experimental study of the vortex end in centrifugal separators: The nature of the vortex end" *Chem. Eng. Sci.* **60** (2005), 6919–6928.
- 88 Kosinski, P. and Hoffmann, A.C. "Modelling of dust lifting using the Lagrangian approach" *Int. J. of Multiphase Flow* **31** (2005), 1097–1115.

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- 92 Suci, C. and Hoffmann, A.C. "Sol-Gel Production of ZrO₂ and YSZ with a New Organic Precursor" *Proceedings of WCPT5, The Fifth World Conference on Particle Technology*, Orlando, Florida, April 23–27, 2006. Paper 234c.
- 93 Schaafsma, S.H., Marx, T. and Hoffmann, A.C. "Investigation of the particle flow-pattern and segregation in tapered fluidized bed granulators" *Chem. Eng. Sci.* **61** (2006), 4467–4475.
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