

UNIVERSITY OF PRETORIA
CURRICULUM VITAE- Dr Axel Lexmond

1. BIOGRAPHICAL SKETCH

1.1 GENERAL INFORMATION

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|----------------------------|---|--|----------|--|----------------------------|-----------------|----------------------------|---|-------------------------------|---|
| Surname | Lexmond | | | | First names | Axel Sebastiaan | | | | |
| Citizenship | Dutch | | | | Title | Dr | Female | | Male | X |
| Population group | African | | Coloured | | Indian | | White | X | Other (Please specify) | |
| Department | Mechanical and Aeronautical Engineering | | | | Position | Senior Lecturer | | | | |
| Direct Telephone | 6898 | | | | Direct Telefax | | | | | |
| E-mail | Axel.lexmond@up.ac.za | | | | | | | | | |
| Date of appointment | December 1 st 2012 | | | | Permanent full-time | X | Temporary full-time | | | |

1.2 ACADEMIC QUALIFICATIONS OBTAINED

| Degree/ Diploma | Field of study | Higher education institution | Year | Distinctions |
|----------------------------|------------------------|-------------------------------------|-------------|---------------------|
| PhD | Mechanical Engineering | Eindhoven University of Technology | 2003 | |
| MSc | Chemical Engineering | Delft University of Technology | 1996 | |

1.3 WORK EXPERIENCE TO DATE

| Name of employer | Capacity and/or type of work | Period From mm//yy to mm//yy |
|--|---|---|
| University of Pretoria | Senior Lecturer | 2012-now |
| Netherlands Organisation for Applied Scientific Research (TNO) | Senior Scientist: Leading of Innovation programs and development of applicable (and patentable) innovations for industrial clients in the field of immersion lithography and chemical reactors for process intensification | 2007-2012 |
| Unilever | Process Development Manager: development of sterilization and pasteurization processes, Process improvement through enhancement of | 2005-2007 |

| | | |
|--------------------------------|---|-----------|
| | heat and mass transfer in multiphase flows | |
| Delft University of Technology | Post doc: Mixing and enhanced heat transfer in nuclear reactor rod bundles | 2004-2005 |

2. TEACHING ACTIVITIES

| 2.1 Courses presented | | |
|--|---|----------------------------|
| Course | Level (e.g. second year, Masters) | Self developed (Yes or No) |
| MTX 311 Thermodynamics | 3 rd year (undergraduate) 2013, 2014 | Yes |
| MTX 781 Design with Constructal theory | Post graduate 2013, 2014 | No |
| Immersion module of the TNO Advanced Lithography course | Masterclass (MSc & PhD) 2009 | Yes |
| Thermal processing of the Unilever global Food processing course | Young professionals (MSc's) 2004,2005 | Yes |
| Heat and Mass transfer of the Unilever global Food processing course | Young professionals (MSc's) 2004,2005 | Yes |
| Advanced food processing course | Medior Professionals (MSc's) 2005 | No |

| 2.2 Other education and pedagogic courses presented | | |
|---|-----------|---|
| Course | Year | Institution |
| PGO (problem oriented learning) | 2000-2002 | Department of Mechanical Engineering, Eindhoven University of Technology |
| Transport phenomena for mechanical engineers, problem solving module | 2001,2002 | Eindhoven University of Technology |
| PGO (problem oriented learning) | 2002 | Department of TeMa (Science and Society), Eindhoven University of Technology |
| Voluntary course "introduction to experimental science" | 2004,2005 | Department of applied physical sciences (TNW), Delft University of Technology |
| Private tuition Physics, Chemistry and Mathematics for grade 10-12 and undergraduate students | 1988-2000 | Yes |

3 TEACHING OUTPUTS

3.1 Educational publications and products

1. A S Lexmond, Study guide Thermodynamics MTX311, Department of Mechanical and Aeronautical Engineering, University of Pretoria, Pretoria, January 2013.
2. A S Lexmond, Drop pinch-off from hydrophobic heat exchanger plates, PhD. Thesis, Eindhoven University of Technology, 2003.
3. A S Lexmond, A new approach to describe and understand CFB hydrodynamics using spatiotemporal chaos analysis, MSc Thesis, Delft University of Technology (1996).

4. OTHER TEACHING CONTRIBUTIONS

4.1 Membership of national and international bodies

None at present.

4.2 Visits to local and overseas universities as guest professor or lecturer in regard to teaching

None at present.

4.3 Participation in national and international teaching associations, bodies, committees

None at present.

5 RESEARCH ACTIVITIES

5.1 Former supervision or co-supervision (*completed*)

| Name of student | Degree/Title of dissertation/thesis and date | Supervisor | Co-supervisor(s) | Duration of studies (years) |
|-----------------|---|--------------------|------------------------------|-----------------------------|
| J Negro | MSc, Re-entrainment from plastic heat exchangers (1999) | A S Lexmond | C W M van der Geld | 1 |
| F Weitz | MSc, The effect of inserts on heat transfer drainage and gas cleaning efficiency of plastic exchangers (1998) | C W M van der Geld | F L A Ganzevles, A S Lexmond | 1 |

5.2 Current post-graduate students

| Name of student | Degree | Project title | Supervisor | Co-supervisor(s) | Year of registration |
|-----------------|--------|---|----------------------|------------------|----------------------|
| Marnus Koorts | Master | Entropy Minimisation and Structural Design for Industrial Heat Exchanger Optimisation | Prof T Bello-Ochende | Dr A S Lexmond | 2011 |
| Nicole Andrew | Master | Modelling of a Platinum Smelting Furnace to Study Slag Bath Temperature and Freeze | Dr Johan Zietsman | Dr A S Lexmond | 2013 |

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|-----------------|--------|---|-----------------|---------------------|------|
| | | Lining Behaviour | | | |
| Logan Rosenberg | Master | Experimental Investigation of reactive Multi Species Mass Transfer in Feedlot Cow Manure for a Techno-Economic Model of Biogas Production in South Africa | Dr Axel Lexmond | Dr Gerrit Kornelius | 2014 |

| 5.3 Obtaining research funds (<i>Optional</i>) | | | |
|---|---|-----------|---|
| Origin of research funds (e.g. contract research, THRIP, international funding organisations, other(s)) | Title of research project or programme | Duration | Money allocated (R) (<i>Optional</i>) |
| UP research development program | Flow visualization and mass transfer measurements in a novel chemical reactor with controlled mixing and improved temperature homogeneity | 2013-2015 | |

6 RESEARCH OUTPUTS

6.1 Publications in peer-reviewed or refereed journals

- 1 Van der Geld CWM, van Neer PLMJ, van de Sande B and Lexmond AS, Low-amplitude acoustic enhancement of bubble detachment in pool boiling submitted (2013), Physics of Fluids.
- 2 Lexmond A, Roelands M, de Graaff MP and Bassett JM. Efficient process intensification of fine chemical production: A new classification tool for flow chemistry technologies, Chimica Oggi 28 (6), pp46-48, 2010.
- 3 Lexmond AS and van der Geld CWM, The effect of fluid flow on detachment of drops in the wake of a flat plate, Exp. Thermal and Fluid Science, v29, no. 3 (2005), pp363-370.
- 4 Cheng L, van der Geld CWM and Lexmond AS, Study and visualization of droplet entrainment from a polymer plate heat exchanger, International Journal of Heat Exchangers, v5, no. 2 (2004), pp359-378.

6.2 Books and/or chapters in books

- 1 Weitz F, van der Geld CWM, Ganzevles FLA and Lexmond AS, The effect of inserts on heat transfer, drainage and gas cleaning efficiency of plastic exchangers in Compact heat exchangers and enhancement technology for the process industries; Editors: R.K. Shah, 507-514, Begell House Inc., Book Chapter ISBN 1-56700-134-3 (1999).

6.3 Published full-length conference papers/keynote addresses

1. Andrew NJ, van Beek B, Lexmond AS and Zietsman JH, Effect of feed fluctuations on a platinum furnace energy, balance to study slag temperature, Pyrometallurgical modelling conference August 4-5, 2014.
2. Geers L, Lexmond AS and Van Rooijen MS, shared research for process intensification - An example project, 2012 Annual Meeting, Conference Proceedings.
3. Lexmond AS, Mudde RF and van der Hagen THJJ, Visualisation of the vortex street and characterisation of the cross flow in the gap between two sub-channels, in NURETH-11 (Paper: 122), October 2-6, 2005.

4. Lexmond AS and van der Geld CWM, The effect of plate thickness, surface tension and fluid flow on detachment of drops from a plate, in 3rd Int. Symposium on Two-Phase Modeling and Experimentation, Italy, 1-6, (2004).
5. Lexmond AS and van der Geld CWM, The effect of fluid flow on detachment of drops in the wake of a flat plate, in 3th European-Japanese Two-Phase Flow Group Meeting, Italy, 1-7, (2003).

6.4 Non-refereed publications or popular articles

- 1 Lexmond AS and van der Geld CWM, The effect of fluid flow on detachment of drops in the wake of a flat plate, in 3th European-Japanese Two-Phase Flow Group Meeting, Italy, 1-7, (2003).
- 2 Lexmond AS, van der Geld CWM and Negro J, Re-entrainment from plastic heat exchangers, in European Two-Phase Flow Group Meeting; Karlsruhe, Germany, 1-13, (2000).

6.5 Patents

1. Roelands CPM, Lexmond AS, Goetheer ELV and Geers LFG, Method for physical and/or chemical processes, WO2014058320 (A1) 2014-04-17.
2. Lexmond AS, van Zwet EJ and Maas DJ, System and method for overlay control, WO2013085389 (A2) WO2013085389 (A3) 2011-12-09.
3. Maas JD, van Someren B, Lexmond AS, Spee CIMA, Duistewinkel AE and Meer AJPM, Apparatus and method for atomic layer deposition, US2012003396 (A1) 2012-01-05.
4. Smits SWAH, van Empel TAR, Muijtens MJEH, Cheng L, Janssen FJJ, van Helden WA, Versluis R, Schaareman PBJ, Lexmond AS, Nieuwkoop E, Potts CWB, Lemmen MHJ, van der Graaf V, de Kroon MGM and Velthuis JFM, Method and system for thermally conditioning an optical element, US2011310368 (A1) 2011-12-22.
5. Lexmond AS, Wengersbusch NM, van der Heiden MS and Jansen R, A microfluidic device, a method of separating a multiphase fluid and a fluid conduit comprising a microfluidic device, EP2338580 (A1) 2011-06-29.
6. Duisterwinkel AE, Sandke M, Kort R and Lexmond AS, Apparatus for detecting viable microorganisms or spores in a sample and the use thereof; WO2010151131 (A2) 2010-12-29 WO2010151131 (A3) 2011-04-21.
- 7 Lexmond AS and Keijzer P, Microfluidic system with chamber and means for generating alternating magnetic fields, EP2311564 (A1) 2011-04-20.
- 8 Lexmond AS, Donders S, Jacobs J and Geers L, Lithographic apparatus, a metrology apparatus and a method of using the apparatus NL2002964 (A1) 2009-12-17.

6.6 Technical reports

- 1 Lexmond AS, Combined power/fresh water production at elevated temperatures using nuclear reactor for heat at 400°C, Report for Thorium, July 2014
- 2 TNO-Lithography
 - 2 internal research reports
 - 6 customer reports
- 3 TNO-Process Intensification
 - 9 internal research reports
 - 22 customer reports
- 4 TNO-other
 - 1 internal research report
 - 6 shared research projects
 - 8 customer reports
- 5 Co-editor of best practice document foods processing, Unilever Global

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| 6 | Co-editor of Foods Development Unit hazop Document |
| 7 | Uniliver, Foods Development, >50 production requirements reports for liquid foods customer and B2B products |
| 6.7 | |

7 OTHER SCHOLARLY RESEARCH-BASED CONTRIBUTIONS

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| 7.1 Participation in conferences, workshops and short courses - specify type of contribution |
| Provide full details of participation in national and international conferences, etc. |
| 7.1.1 National |
| 1. SAIMM Pyrometallurgical Modelling Conference August 4-5, 2014, Johannesburg, South Africa. |
| 7.1.2 international |
| 1. Spie, Advanced Lithography Conference, 24 - 29 February 2008, San Jose, California, United States. |
| 2. European Two-Phase Flow Group Meeting; Karlsruhe Germany, 1-13, (2000). |

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| 7.2 Teamwork and collaboration with others: |
| 1 Collaboration with Johan Zietsman (University of Pretoria) on Validation of Numerical Simulations for Pyrometallurgy. |
| 2 Collaboration with Natasia Naude (University of Pretoria) on Phase Separation Enhancement for ore Upgrading. |
| 3 Collaboration with Leonard Bothma (Tshwane University of Technology) on Implementation of Renewable Energy (solar cell cooling and application of pyrolysis oils). |
| 4 Collaboration with Leon Geers (TNO) on Applied Fluid Mechanics for Chemical Reactors. |

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| 7.3 Membership in national and international bodies |
| None at present. |

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| 7.4 Visits to local and overseas universities or research institutes as guest professor or researcher |
| None at present. |

8 ARTISTIC OUTPUTS (*if applicable*)

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| 8.1 None at present. |
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9 MANAGEMENT AND ADMINISTRATIVE DUTIES

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| 9.1 None at present. |
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10 COMMUNITY SERVICE OR PROFESSIONAL SKILLS

10.1 Outreach projects

None at present.

10.2 Professional service performed

None at present.

10.3 Clinical service

None at present.

10.4 Involvement with other universities/scientific institutions

Tshwane University of Technology, commercialization of renewable energy.

Eindhoven University of Technology, multi-phase flow.

TNO (Netherlands Organisation for Applied Scientific Research), various topics.

Mintek experimental validation.

10.5 Referee duties

Master thesis referee for Marnus Koorts, Entropy Minimization and Structural Design for Industrial Heat Exchanger Optimization, 2012.

11 AWARDS AND SCIENTIFIC/SCHOLARLY RECOGNITION

None at present.