

Curriculum vitae Prof. dr. ir. Kevin M. Van Geem; ERC Consolidator grant OPTIMA 2019

Personal details

Date/place of Birth: July 9, 1977, Ghent, Belgium
 Nationality: Belgian
 Marital Status: Married to Ineke Celie, Master of Chemical Engineering
 Father of Kobe (2010) and Wout (2012)



Affiliation

Laboratory for Chemical Technology, Faculty of Engineering, Ghent University, Belgium

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Professional experience

2019-present Director of the board of LCT and Director of Centre of Sustainable Chemistry (CSC)
 2018 visiting professor Stanford
 2017-present Full professor in Thermochemical Reaction Engineering, Ghent University
 Director of the steam cracking pilot plant at LCT,
 2015-2017 Associate professor in Thermochemical Reaction Engineering, Ghent University
 2010-2015 Assistant professor in Thermochemical Reaction Engineering, Ghent University
 2009- 2010 Fulbright postdoctoral researcher at Massachusetts Institute of Technology (MIT)
 2008- 2009 Postdoctoral researcher at Massachusetts Institute of Technology (MIT)
 2006 - 2009 F.W.O. postdoctoral researcher at LCT, Ghent University
 2002 - 2006 I.W.T Ph.D. fellow at LCT, Ghent University
 2001 ExxonMobil Belgium

Education

2009 Fulbright Post-doctoral researcher, Massachusetts Institute of Technology
 2008 Post-doctoral Researcher, Massachusetts Institute of Technology, Prof. W.H. Green
 2007 F.W.O. Post-doctoral Student, LCT, Ghent University
 2006 Ph.D. in Chemical Engineering, Ghent University, advisor Prof. Guy B. Marin
 2004 Visiting Researcher, Massachusetts Institute of Technology, Prof. W.H. Green
 2001 “Burgerlijk Scheikundig Ingenieur” (Master in Chemical Engineering), Ghent University, magna cum laude

Summary of the scientific output and major achievements up till present (WOS h-index of 33, Scopus: h-index 36):

Publications in WOS: 172 published (17 as first author); 5 accepted, 5 submitted

5 publications:

1. Van Geem, K. M.; Galvita, V. V.; Marin, G. B., *Making chemicals with electricity. Science* 2019, 364, (6442), 734-735.
2. Amghizar, I.; Vandewalle, L. A.; Van Geem, K. M.; Marin, G. B., *New Trends in Olefin Production. Engineering* 2017, 3, (2), 171-178.
3. Ragaert, K.; Delva, L.; Van Geem, K., *Mechanical and chemical recycling of solid plastic waste. Waste Manage.* 2017, 69, (Supplement C), 24-58.
4. Sileghem, L.; Alekseev, V. A.; Vancoillie, J.; Van Geem, K. M.; Nilsson, E. J. K.; Verhelst, S.; Konnov, A. A., *Laminar burning velocity of gasoline and the gasoline surrogate components iso-octane, n-heptane and toluene. Fuel* 2013, 112, 355-365.
5. Van Geem, K. M.; Reyniers, M.-F.; Marin, G. B.; Song, J.; Green, W. H.; Matheu, D. M., *Automatic reaction network generation using RMG for steam cracking of n-hexane. AIChE Journal* 2006, 52, (2), 718-730

Books: 2

1. 40 vragen voor 2020
L. Taerwe, H. Romaen, K.M. Van Geem, K. Verbeken
2012, ISBN: 9789020980011 1st and 2nd edition, 296 pages, Publisher: Lannoo
2. Sustainable Chemical Production Processes
K.M. Van Geem and Guy B. Marin
2019, to be published by De Gruyter

Research Group:

Present: promoter of 35 Ph.D. candidates, 13 undergraduate students, 4 postdoctoral researchers

Past: advisor of 15 Ph.D. researchers, 13 postdoctoral researchers, 90 undergraduate students

Presentations at international congresses and in institutes:

130 oral presentations (1 plenary and 9 key note presentations) at international conferences and 50 oral presentations at companies.

Patents

3

Infrastructure

- 1 pilot plant for steam cracking, super dry reforming and 1 for chemical recycling
- 8 bench scale setups
- 6 GCxGC with MS, SCD, NCD, FID

Spin-off

- AVGI, started in 2015, Reaction engineering solutions for the chemical industry

Grants and awards

1. Stanford University CTR fellowship 2020
2. Fulbright scholarship 2009
3. FWO postdoctoral fellowship 2006 (6 years)
4. Travel grant for stays at MIT (3) from FWO, 15000€ total, 2004, 2008, 2009
5. IWT research scholarship 2002 (4 years)
6. Laureate Chemistry Olympics, 1995

Educational activities

1. Lecturer for several courses (e.g. **Sustainable Chemical Production Processes**) amounting to an equivalent of 15 ECTS points in the bachelor and master in chemical engineering at Ghent University.
2. Summer and winter courses e.g. (**Fuel me up. The BIO-path to the future!, introduction to reaction engineering**), Ghent, Belgium, 2012 and 2013. TOPCOMBI winter course on: **Design and Optimization of Catalytic Processes: From Laboratory Experiments to Design of Industrial Reactors**, Ghent, Belgium, January 11-15, 2010.

Services to the academic community

1. Organizer of Chemreactor and MACKIE in Ghent (2018)
2. Organizer of International Conference on Chemical Kinetics (ICCK) in 2013 in Seville and ICCK 2015 in Gent.
3. Member of the Scientific and Organization Committee: International conference on Chemical Kinetics (ICCK 2011), Cambridge, MA, USA, July 10-14, 2011; International conference on Chemical Kinetics (ICCK 2013), Seville, Spain, July 8-12, 2013
4. Referee for more than 30 journals, amongst others several high-impact journals: Chemical Reviews (IF: 40.197); Angewandte Chemie (I.F.: 13.734); Catalysis Reviews (IF: 7.500); Bioresource Technology (IF: 4.987), Combustion and Flame (I.F.: 3.599); etc.
5. Session chair: '**De-Polymerization and Ring-Opening Pyrolysis**' and '**Poster session**' at International conference on Chemical Kinetics (ICCK 2011), Cambridge, Ma, USA, July 10-14, 2011
6. Member of the **COST action** CM0901 and CM1404-SMARTCAT
7. Member of the Process Engineering for Sustainable Energy section of EFCE

8. External PhD jury member for 9 PhD's: ENSIC Nancy (2), Univ. Orléans (3), Universiteit Hasselt (2), Univ. de Toulouse, TU Delft

Academic collaborations

A broad network of academic collaborations has been established throughout Europe and even worldwide with groups that belong to the top of the World in their specific research area. There has been and is a long lasting cooperation with Prof. Green (Massachusetts Institute of Technology) in the field of thermochemical reaction engineering. My membership of the COST action CM0901 on cleaner combustion has intensified collaboration between UGent, Politecnico di Milano and Centre National de la Recherche Scientifique de Nancy more specific with Prof. Ranzi (Milano) and Prof. Battin-Leclerc (Nancy).

There is also a strong interaction with institutes focusing on biomass genetic modification (Prof. Boerjan and Prof. Inzé, Vlaams Instituut voor Biotechnologie), and on the use of biomass for production of fuels and energy (Prof. Sels KU Leuven; Prof. Harlin, Technical Research Centre of Finland VTT). My group also belongs to the multidisciplinary partnership Ghent Bio-economy of Em. Prof. Verstraete and Prof. Soetaert, which creates a lot of interaction within Ghent University on the use of biomass.

In the field of compositional modeling my group collaborates with the University of Delaware (Prof. Klein) and with IFP-EN (dr. Verstraete). For GC×GC there was collaboration with the University of Amsterdam (Em. Prof. Beens and dr. Blomberg). For process simulation, control and optimization there is a bilateral scientific cooperation with Prof. Zhou and Prof. Qian from the UNILAB, State-Key Laboratory of Chemical Engineering, East China University of Science and Technology (ECUST) in Shanghai. A recent project on bio-oil purification using metal organic framework was initiated together with Prof. De Vos (KU Leuven) funded by Belgian Federal government. Finally for Computational Fluid Dynamics my group collaborates with the group of Prof. Fox and Prof. Passalacqua (Iowa State University)

Coordinator of large projects:

IMPROOF (SPIRE H2020, Scientific coordinator 2016-2020): IMPROOF will develop and demonstrate the steam cracking furnace of the 21st century. The objective of the present proposal is to drastically improve the energy efficiency of steam cracking furnaces by at least 20%, and this in a cost effective way, while simultaneously reducing emissions of greenhouse gases and NOX per ton ethylene produced with at least 25%.

OPTIMA (ERC consolidator, Scientific coordinator, 2019-2024): Driven by process intensification and in combination with the enormous power of high performance computing (HPC) his ERC project OPTIMA will take full advantage of 3D printing and the enormous power of supercomputers to enhance heat and mass transfer in advanced chemical reactors by using multiscale modelling and experimentation starting from renewable feedstocks.

Bioleum (IWT-SBO, 2014-2018, LCT): The aim is to develop and demonstrate a new disruptive technology, the GSVR for the conversion of biomass to chemicals and fuels via fast pyrolysis based on an innovative reactor concept. Besides reactor engineering, attention was given to genetic modification of plants to optimize product yields, and to purify, fractionate and extract valuable compounds from the products.

PSYCHE (Interreg France-Wallonie-Vlaanderen, Scientific coordinator 2018-2022): The PSYCHE project focusses on the production of base chemicals out of plastic waste for application in the chemical industry. The gasification of several plastic waste streams will be demonstrated by using an innovative technology. The obtained gas will then be catalytically transformed into base chemicals such as linear alpha-olefins.

WATCH (Catalisti, Scientific coordinator 2019-2023): The WATCH SBO-project aims at the development and demonstration of a new disruptive technology for the conversion of plastic waste to chemicals via catalytic fast pyrolysis based on an innovative reactor concept. The latter technology will be benchmarked against classic, state-of-the-art pyrolysis technology and a sustainability assessment will be performed. Moreover, novel catalyst systems will be developed for the catalytic conversion of pyrolysis fractions and focus will also be on the development of more efficient processes for separation of valuable components.