

PhD – Engineering science

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Bio-engineer

Biochemical industries

FORMATION

2013 – 2017	PhD in engineering science ➤ Defended on the 25th of October 2017 in Brussels in front of the jury composed by M. Gérard DEGREZ Examiner M. Julien FAVIER Examiner M. Benoît HAUT Thesis supervisor M. Renaud LOUIS Examiner M. Antoine NONCLERCQ Examiner M. Benoît SCHEID Examiner M. Alain VAN MUYLEM Thesis supervisor	<i>Université libre de Bruxelles (ULB) École polytechnique de Bruxelles TIPs laboratory Brussels, Belgium</i>
2013 – 2014	First year of master in Industrial Management	<i>ULB – Solvay Brussels School Brussels, Belgium</i>
2008 – 2013	Master in bio-engineering, specialization in biochemical industries	<i>ULB Brussels, Belgium</i>

PROFESSIONAL EXPERIENCE

Dec 2022 – Present	Postdoctoral researcher ➤ Modelling of the respiratory system in health and disease	<i>Sorbonne Université – UPMC Paris, France</i>
Sept 2021 – Aug 2022	Postdoctoral researcher ➤ Bio-informatics and cancer somatic mutations	<i>Université libre de Bruxelles Brussels, Belgium</i>
Jan 2019 – Aug 2021	Postdoctoral researcher ➤ Biophysics of the respiratory system	<i>Université Côte d’Azur Nice, France</i>
Oct – Dec 2018	High school science teacher ➤ Introduction to science, Physics & Biology	<i>Athénée Robert Catteau Brussels, Belgium</i>

RESEARCH ACTIVITIES

Dec 2022 – Present	PostDoc ➤ Research themes: <i>Modelling of ventilation, respiratory biophysics, personalized medicine</i> (Direction: C. GRANDMONT & L. BOUDIN)	<i>Sorbonne Université – UPMC Jacques-Louis Lions laboratory Paris, France</i>
Sept 2021 – Aug 2022	PostDoc ➤ Research themes: <i>Somatic mutations, Cancer, bioinformatics analyses – genes and proteins</i> (Direction: M. ROOMAN)	<i>ULB – École polytechnique de Bruxelles 3BIO laboratory Brussels, Belgium</i>
Jan 2019 – Aug 2021	PostDoc ➤ Research themes: <i>Pulmonary morphogenesis, Machine Learning, Transport phenomena, Modelling of the respiratory physiology</i> (Direction: B. MAUROY)	<i>Université Côte d’Azur J.A. Dieudonné laboratory Nice, France</i>
Oct 2013 – Oct 2017	PhD Thesis ➤ <i>Mathematical modeling of nitric oxide and mucus dynamics in the human lungs, using a phenomenological approach, to provide new insights into asthma and cystic fibrosis</i> (Direction: B. HAUT & A. VAN MUYLEM)	<i>ULB – École polytechnique de Bruxelles TIPs laboratory Brussels, Belgium</i>

TEACHING ACTIVITIES

2021	Teaching assistant <ul style="list-style-type: none">➤ <i>Introduction to bioinformatics and its applications</i>: 20 h/year, MA1/MA2 level.	<i>ULB – École polytechnique de Bruxelles</i> Brussels, Belgium
Oct 2018 – Dec 2018	Science teacher <ul style="list-style-type: none">➤ <i>Biology</i> (1 h/week), <i>Introduction to Science</i> (12 h/week), <i>Physics</i> (9 h/week)	<i>Athénée Robert Catteau</i> Brussels, Belgium
2013 – 2017	Teaching assistant <ul style="list-style-type: none">➤ <i>Physical Chemistry</i>: 36 h/year, BA2 level.	<i>ULB – École polytechnique de Bruxelles</i> Brussels, Belgium

COMPLEMENTARY EXPERIENCE

Oct 2015 – Aug 2016	Management of a cooperation in development project <ul style="list-style-type: none">➤ Digitalization of a health center in Kinshasa, DRC.➤ Management of 4 MA1 engineering students➤ Formation in project management.	<i>ULB – MECRECO</i> DR Congo
Oct 2013 – Aug 2014	Management of a cooperation in development project <ul style="list-style-type: none">➤ Setting up of a biofuel workflow.➤ Management of 6 MA1 engineering students➤ Formation in project management and transport phenomena.	<i>ULB – Geres</i> Mali
Oct 2011 – Aug 2012	Cooperation in development project <ul style="list-style-type: none">➤ Setting up of a biofuel workflow in Bohicon, Benin.➤ Group of 6 MA1 engineering students.➤ Technical and engineering skills.	<i>ULB – Geres</i> Benin

LINGUISTIC, COMPUTER & SCIENCE SKILLS

French:	Mother tongue (C2)
English:	Full proficiency (C1-C2)
Dutch:	Intermediate knowledge (B1)
Arabic:	Basic knowledge, including reading and writing (A2)

<u>Informatics:</u>	Windows, Office, Programming (C++, Python), web-design
<u>Scientific softwares:</u>	Mathematica, Scikit Learn, MATLAB, R, PyMOL
<u>Scientific skills:</u>	Mathematical modelling, Fluid and Transport phenomena, Machine Learning Molecular biology (PCR, qPCR, cell culture)

LIST OF PUBLICATIONS

Master & PhD Theses

[T2] **Karamaoun C.** (2017) *Mathematical modeling of nitric oxide and mucus dynamics in the human lungs, using a phenomenological approach, to provide new insights into asthma and cystic fibrosis*. PhD thesis, École polytechnique de Bruxelles, Université libre de Bruxelles, Belgium.

[T1] **Karamaoun C.** (2013) *Etude du mécanisme post-transcriptionnel de l'expression de plusieurs gènes clés du métabolisme énergétique*. Master thesis, Université libre de Bruxelles, Belgium.

Peer-reviewed articles

[A6] Haut B., **Karamaoun C.**, Mauroy B. and Sobac B. (2023) Water and heat exchanges in mammalian lungs. *Sci. Rep.* 13, 6636. doi: 10.1038/s41598-023-33052-y.

[A5] **Karamaoun C.**, Haut B., Blain G., Bernard A., Daussin F., Dekerle J., Bougault V. and Mauroy B. (2022) Is airway damage during physical exercise related to airway dehydration? Inputs from a computational model. *J. Appl. Physiol.* 132:4. doi: 10.1152/jappphysiol.00520.2021

[A4] Noël F., **Karamaoun C.**, Dempsey A. J., Mauroy B. (2021) The origin of the allometric scaling of lung ventilation in mammals. *Peer Community Journal.* 2:e2. doi: 10.24072/pci.mcb.100005

[A3] **Karamaoun C.**, Sobac B., Mauroy B., Van Muylem A. and Haut B. (2018) New Insights into the Mechanisms Controlling the Bronchial Mucus Balance. *PLoS One.* 13(6). doi: 10.1371/journal.pone.0199319

[A2] **Karamaoun C.**, Haut B. and Van Muylem A. (2018) A new role for exhaled nitric oxide as a functional marker of peripheral airway calibre changes: a theoretical study. *Journal of Applied Physiology.* 124:4. doi: 10.1152/jappphysiol.00530.2017

[A1] **Karamaoun C.**, Van Muylem A. and Haut B. (2016) Modeling of the Nitric Oxide Transport in the Human Lungs. *Front. Physiol.* 7:255. doi: 10.3389/fphys.2016.00255

Preprints

[PP2] **Karamaoun C.**, Kumar H., Argentina M., Clamond D. and Mauroy B. (2021) Curvature-induced motion of a thin Bingham layer in airways bifurcations. arXiv:2112.11084. *Under review*.

[PP1] Sobac B., **Karamaoun C.**, Haut B. and Mauroy B. (2019) Allometric scaling of heat and water exchanges in the mammals' lung. arXiv:1911.11700

Conference proceedings

[AC1] **Karamaoun C.**, Sobac B., Mauroy B., Van Muylem A. and Haut B. (2019) New analysis of the mechanisms controlling the bronchial mucus balance. 27th *Canadian Congress of Applied Mechanics*, Sherbrooke, Canada.

Invited seminars

[S1] **Karamaoun C.**, (2023) Multidisciplinary approach for studying the thermal and water losses in exercise-induced asthma. Laboratoire des Fluides Complexes et leurs Réservoirs (LFCR), Université de Pau et des Pays de l'Adour (UPPA), Anglet, France.

Book chapters

[BC1] Goupil C., Herbert E., **Karamaoun C.**, Mauroy B., Noël F. (2023) Economy of organ shapes and function in *Economic Principles in Cell Biology*, 2nd edition.

Oral communications

[C7] **Karamaoun C.**, Noël F. (2023) Organ scaling and function. *2nd Summer School on Economic principles in cell biology*, Paris, France.

[C6] **Karamaoun C.**, Haut B., Blain G., Bernard A., Daussin F., Dekerle J., Mauroy B. and Bougault V. (2021) Link between airway damage and dehydration of the airways computationally determined by an original model. *19th Congress of the Association des Chercheurs en Activités Physiques et Sportives - ACAPS*, Montpellier, France.

[C5] Bokobza E., Tiroille V., **Karamaoun C.**, Argentina M., Mauroy B., Hinault C., Bost F., Clavel S., Chevalier N. (2021) Organoids as a model to study the impact of EDCs on the prostate gland. *European Congress of Endocrinology*, live session.

[C4] **Karamaoun C.**, Sobac B., Haut B., Bernard A., Daussin F., Dekerle J., Bougault V., Mauroy B. (2019) The lung: a heat and water exchanger? *1st VentiCorse meeting*, Cargèse, France.

[C3] **Karamaoun C.**, Sobac B., Haut B., Bernard A., Daussin F., Dekerle J., Bougault V., Mauroy B. (2019) Interplay between thermal transfers and degradation of the bronchial epithelium during exercise. *1st CompBioMed Conference*, Londres, Royaume-Uni.

[C2] **Karamaoun C.**, Sobac B., Mauroy B., Van Muylem A. and Haut B. (2019) New analysis of the mechanisms controlling the bronchial mucus balance. *27th Canadian Congress of Applied Mechanics*, Sherbrooke, Canada.

[C1] **Karamaoun C.**, Van Muylem A. and Haut B. (2017) Gas-liquid exchanges in the human lungs – analogy with chemical engineering. *13th International Conference on Gas-Liquid-Solid Reactor Engineering*, Bruxelles, Belgique.

Poster communications

[P5] **Karamaoun C.**, Hermans P., Pucci F., Rooman M. (2022) Relation between genome mutability, variant pathogenicity and vertical ionization potential of nucleobase motifs. *21st European Conference on Computational Biology*, Sitges, Barcelona, Spain.

[P4] **Karamaoun C.**, Mauroy B., Argentina M. (2022) An original computational framework offers new perspectives for exhaled nitric oxide. *European Respiratory Society Congress*, Barcelona, Spain

[P3] **Karamaoun C.**, Sobac B., Mauroy B., Van Muylem A. and Haut B. (2019) Heat and water transfers in the bronchi: clinical insights from a theoretical modeling study. *European Respiratory Society Congress*, Madrid, Spain.

[P2] **Karamaoun C.**, Haccuria A., Michils A., Haut B. and Van Muylem A. (2017) Experimental and theoretical impact of hypertonic saline induction on exhaled nitric oxide. *European Respiratory Society Congress*, Milan, Italy.

[P1] **Karamaoun C.**, Van Muylem A. and Haut B. (2015) Simulation of airway calibre and inflammation interaction by a new model of airway epithelium. *European Respiratory Society Congress*, Amsterdam, Netherlands.

FORMATION & TEACHING OF SCIENTIFIC RESEARCH

Karamaoun C., Mauroy B., Monticelli M. (2020) Fractals and the lung, why breathing is (also) mathematics, *Fête de la Science – live*, Nice, France.

- YouTube live presentation on the links between mathematical modelling and health research, by taking the respiratory system modelling as an example.
- Presentation addressed to high schools in the Alpes-Maritimes. Video: <https://cutt.ly/XgUuDuz>

Karamaoun C., Mauroy B., Monticelli M., Noël F. (2019) Optimization of ventilation for sport performance, *Festival Sport-Santé*, Marseille, France.

- Setting-up of a 3D experiment for ventilation visualization. Posters and videos in relation with breathing in athletes

Karamaoun C., Mauroy B., Monticelli M. (2019) Mathemarium – Lungs and Mathematics, *Fête de la Science*, Nice, France.

- Setting-up of a series of practical tools 2D and 3D on the links between the lung and mathematics: geometry, fractals, graphs, mechanics, etc.