**Simon Gravelle** **28 years old, Ph.D.**

Jacques Dumais bio-engineering group
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## Research activities:

- **Transport at the scale of the nanopore** – capillarity, mass flow, entrance effects, filtration;
- **Electrokinetic in charged nanopore** – nanofluidic diodes, noise analysis, polarisation effects;
- **Mass transport at the macroscale** – bio-inspired membranes;
- **Plant cell division** – modelling of the cytoskeleton dynamics.

## Expertise:

- **Molecular dynamics** – nanoscale flows, carbon nanofluidics, charged nanopores, electrokinetic effects;
- **Finite element method** – transport through nanoporous media, electrokinetic effects;
- **Analytical models** – membrane transport, thermoregulation;
- **Fluorescence correlation spectroscopy** – mass flow measurements through slit nanochannel.

## Publications:

Google Scholar profile

- **Simon Gravelle**, Hiroaki Yoshida, Laurent Joly, Christophe Ybert and Lydéric Bocquet : *Carbon membranes for efficient ethanol-water separation* **J. Chem. Phys.** 145 (2016);
- **Simon Gravelle**, Christophe Ybert, Lydéric Bocquet and Laurent Joly : *Anomalous capillary filling and wettability reversal in nanochannels* **PRE** 93 (2016);
- **Simon Gravelle**, Laurent Joly, Christophe Ybert, and Lydéric Bocquet : *Large permeabilities of hourglass nanopores: from hydrodynamics to single file transport.* **J. Chem. Phys.** 141 (2014);
- Alessandro Gadaleta, Catherine Sempere , **Simon Gravelle**, Alessandro Siria, Rémy Fulcrand, Christophe Ybert and Lydéric Bocquet : *Sub-additive ionic transport across arrays of solid-state nanopores.* **Phys. Fluids** 26, 012005 (2014);
- Clara B. Picallo, **Simon Gravelle**, Laurent Joly, Elisabeth Charlaix and Lydéric Bocquet : *Nanofluidic Osmotic Diodes: Theory and Molecular Dynamics Simulations.* **PRL** 111, 244501 [5 pages] (2013);
- **Simon Gravelle**, Laurent Joly, François Detcheverry, Christophe Ybert, Cécile Cottin-Bizonne and Lydéric Bocquet : *Optimizing water permeability through the hourglass shape of aquaporins.* **PNAS** 110 (41), 16367–16372 (2013).

- Adrien Guérin, **Simon Gravelle** and Jacques Dumais : *Forces Behind Plant Cell Division* (Comment) **PNAS** 113 (32), 8891-8893 (2016);
- **Simon Gravelle** : *Nanofluidics: a theoretical and numerical investigation of fluid transport in nanochannels* (Thesis manuscript) Université Claude Bernard, Lyon (2015);
- **Simon Gravelle**, Laurent Joly, François Detcheverry, Christophe Ybert, Cécile Cottin-Bizonne and Lydéric Bocquet : *Perméabilité optimale des aquaporines : une histoire de forme ?* (Vulgarisation) **médecine/sciences** 31 (2015).

## Professional and academic record:

- 2016-today : **Posdoctorate**, UAI, Viña del mar, Chile. *A biomimetic membrane with highly asymmetric water transport properties.* Advisor: Jacques Dumais;

- 2012-2015 : **PhD thesis**, ILM, Lyon, France. *Nanofluidics: a theoretical and numerical investigation of fluid transport in nanochannels.* Advisors: Christophe Ybert, Laurent Joly and Lydéric Bocquet;
  - July 2014 : Invited student at the ICE group, University College London, London, England;
  - December 2013 and May-June 2014 : Invited student at the MIT-CNRS-UMI, Cambridge, Massachusetts;
- 2010-12 : Graduate student in physics at the **ENS** Lyon, Lyon, France;
  - 2012 : Experimental internship, LPMCN. *Experimental study of nanometric flow using fluorescence correlation spectroscopy.* Advisors: Christophe Ybert and Lydéric Bocquet;
  - 2011 : Theoretical and numerical internship, LPMCN. *Nanofluidic, study of an osmotic diode.* Advisors: Laurent Joly and Lydéric Bocquet.
- 2007-10 : Undergraduate student in physics at the University of Franche-Comté, Besançon, France;
- 2007 : Baccalaureate S (Science stream), secondary school E. Belin, Vesoul, France.

## Meetings (speaker):

- November 2016 : *Nanofluidics: a theoretical and numerical investigation of fluid transport in nanochannels.* Ph.D. defense, Lyon, France;
- December 2014 : *Optimizing water permeability through the hourglass shape of aquaporins: From hydrodynamics to single file transport.* Computer Simulation of Combined Fluids, London, England;
- October 2014 : *Pink noise of ionic current, theory and modelisation.* GdR Liquids at interfaces, Bordeaux, France;
- November 2013 : *Does the hourglass shape of aquaporins optimize water permeability?* Division of Fluid Dynamics of the American Physical Society, Pittsburgh, Pennsylvania;
- October 2013 : *Optimizing water permeability through the hourglass shape of aquaporin.* GdR Liquids at interfaces, Lyon, France.

## Supervision of research work:

- 2016-today : co-supervision of Paula Llanos, Ph.D. student *Biophysical Analysis of Division Plane Selection in Plant Cells.*

## Teaching record:

- 2012-15 : Supervisor in material physics in the University Institute of Technology of Lyon, practical work and tutorial classes, Lyon, France;
- 2011-13 : Interrogator in CPGE (preparatory course for entrance examinations in *Grandes Écoles*), Lyon, France.

## References :


- Pr Jacques Dumais (UAI, Viña del Mar, Chile), Post-doctoral advisor;
  E-mail: jacques.dumais@uai.cl
- Pr Lydéric Bocquet (ENS, Paris, France), PhD thesis advisor;
  E-mail: lyderic.bocquet@ens.fr, phone: +33(0) 1 44 323 420
- Dr Christophe Ybert (ILM, Lyon, France), PhD thesis advisor;
  E-mail: christophe.ybert@univ-lyon1.fr, phone: +33(0) 4 72 448 253
- Mdc Laurent Joly (ILM, Lyon, France), PhD thesis advisor.
  E-mail: laurent.joly@univ-lyon1.fr, phone: +33(0) 4 72 432 611