

Prof. Francisco Molina-Lopez  
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**Department of Materials Engineering, KU Leuven, Belgium** (Mar. 2019 – Present)

- **Assistant Professor** in printed functional materials and devices for application on energy, sensing and wearables.
- Active research: **Printed and flexible hybrid inorganic/organic energy harvesting and energy storage devices**: powder processing (mechanical alloying and dispersion); ink formulation and rheological characterization; microstructure and chemical characterization (SEM, XRD, EDS, ICP-OES); electrical characterization; laser 2D/3D printing.
- H2020 ERC Starting Grant 2021 awardee.

**PROFESSIONAL EXPERIENCE**

**Hardware Engineering, Apple Inc., USA.** (Jan. 2018 – Feb. 2019)

- **Senior Touch Module Process Engineer**: Designing process steps, driving vendors in Asia, collaborating with cross-functional teams.

**Department of Chemical Engineering, Stanford University, USA** (Apr. 2016 – Jan. 2018)

- **Postdoctoral Researcher** at Bao Research Group.
- Project: **Inkjet-Printed Stretchable Organic and CNTs-Based Transistors for Biomedical Applications and Skin-Like Electronics.**
- Supervisor: **Prof. Zhenan Bao.**
- Acquired competences: Experience in **processing functional organic materials** (ionic dielectrics, conjugated semiconducting and conducting polymers, sorted and unsorted CNTs) from **solution**; **inkjet printing** of functional materials for **unconventional electronics**; **fabrication and characterization of stretchable and biocompatible field effect transistors.**

**Department of Chemical Engineering, Stanford University, USA** (Oct. 2014 – Apr. 2016)

- **Swiss National Science Foundation Early PostDoc** research fellow at Bao Research Group.
- Project: **Tuning the Morphology of Solution-Based Organic Semiconductors for Fully-Printed Electronics with Improved Performance.**
- Supervisor: **Prof. Zhenan Bao.**

- Acquired competences: Knowledge in thin-film **preparation and morphological characterization of organic semiconductor materials** by means of **microscopy/spectroscopy** (SEM, AFM, UV-Vis) and **synchrotron x-ray diffraction** methods; fabrication and electrical characterization of **organic FETs** and organic **photovoltaic** cells; theoretical knowledge in **transport phenomena** (fluid mechanics, heat and mass transfer).
- **Collaboration** in x-ray characterization: Michael Toney's group at the **Stanford Synchrotron Radiation Lightsource (SSRL), SLAC (USA)**.

## EDUCATION AND TRAINING

### Institute of Microengineering (IMT), EPFL, Switzerland (Mar. 2010 – Jun. 2014)

- **PhD** in Microsystems Engineering.
- Dissertation title: **Inkjet-Printed Multisensor Platform on Flexible Substrates for Environmental Monitoring**.
- Supervisors: **Dr. Danick Briand** and **Prof. Nico de Rooij** at the Sensors, Actuators and Microsystems Laboratory (SAMLAB).
- Funding & Project framework: FP7-**Marie Curie** Initial Training Network (ITN) **fellowship** within the project **FlexSmell** - Gas Sensors on Flexible Substrates for Wireless Applications.
- Acquired competences: Knowledge on **printed, large-area and flexible electronics**; proficiency in **microfabrication** processes (**printing** and **cleanroom** related methods); proficiency in **design, fabrication and characterization** (electrical and mechanical) of **MEMS and chemical/physical sensors**; experience in integration of electronics in **smart textiles** acquired throughout the Swiss *Nano-Tera* project *TWIGS*.
- **Main collaborators:** CSEM (Switzerland), ETH Zürich (Switzerland), the Hebrew University of Jerusalem (Israel), Holst Centre (The Netherlands), University of Manchester (UK) and VTT (Finland).

### VTT Technical Research Centre of Finland, Finland (Oct. 2011 – Jan. 2012 & Dec. 2012 – Feb. 2013)

- **PhD research visitor** under supervision of **Dr. Maria Smolander** within the frame of the FP7-**Marie Curie** ITN **FlexSmell** project.

### University of Granada, Spain (Sep. 2002 – Sep. 2009)

- **Double Major** in **Electrical Engineering (GPA: 8.091 / 10)** and **Physics (GPA: 8.265 / 10)**.
- **Awarded highest GPA** in Electrical Engineering, class of 2008.

### University of California San Diego, USA (Sep. 2008 – Aug. 2009)

- **Undergraduate education abroad (Year GPA: 3.771 / 4)** within the *Education Abroad* program from the University of California.
- Acquired competences: knowledge and training in Nanotechnology and Nanoelectronics; experience in microfabrication within a cleanroom facility.
- **Summer Internship** at the High Speed Devices Group, Department of Electrical Engineering. Supervisor: Prof. Peter Asbeck. Topic: Monte Carlo simulation of carrier transport in graphene following a semi-classical approach.

### EPFL, Switzerland (Oct. 2006 – Aug. 2007)

- **Undergraduate education abroad (Year GPA: 5.3 / 6)** within the European *Erasmus* program.
- Acquired competences: Training in analog / digital integrated electronic circuits design; experience with IC design software Cadence.
- **Summer Internship** at the Laboratory of Microsystems and Microelectronics, Institute of Microengineering. Supervisor: Prof. R. S. Popovic. Topic: Measurements, characterization and simulation of a Hall-effect magnetic microsensor using a multi-step spinning current method.

## TEACHING AND MENTORING EXPERIENCE

- *Materials Physics and Technology for Nanoelectronics*, **Master of Materials Engineering/Master of Nanoscience, Nanotechnology and Nanoengineering**, KU Leuven (Belgium), fall 2020/21.
- *Surface Science and Engineering* course, **Master of Materials Engineering**, KU Leuven (Belgium), spring 2020/21.
- Supervised and co-supervised 3 bachelor students, 6 master students and one 1<sup>st</sup> year PhD student. **Currently supervising** 1 bachelor student, 3 master students, 4 PhD student and co-supervising a postdoctoral researcher.

## GRANTS

- Belgium Excellence of Science (EOS): *Caloritronics in magNETic Weyl semimetals (CONENCT)* (ref. 40007563), consortium budget 4 M€ (personal budget 667.7 k€), success rate ~ 20% (based on previous call), **Dec. 2021**.
- **KU Leuven** Internal Funding Interdisciplinary Network (ID-N): *Understanding and boosting the performance of organic thermoelectrics by a tailored molecular design guided by experiments and simulations* (ref. IDN/21/012), budget 700 k€ shared with Prof. G. Koeckelberghs & Prof. D. Escudero (Dept. Chemistry, KU Leuven), success rate 47 %, **Oct. 2021**.
- **KU Leuven** Internal Funding **C1**: *Towards additive manufacturing of flexible thermoelectric energy harvesters: boosting the performance by laser sintering-induced nanostructuring* (ref. C14/21/078), budget 390 k€, success rate 45%, **Sept. 2021**.

- Research Foundation-Flanders (**FWO**) **Junior Research Project**: *Printed organic photovoltaics for energy harvesting in smart contact lenses* (ref. G065021N), budget 409.8 k€, success rate 21.4 %, **Dec. 2020**.
- European Union *H2020* **ERC-2020-STG** **3DALIGN**: *Enhancing the performance of 3D-printed organic thermoelectrics by electric field-assisted molecular alignment* (ref. 948922), budget 1.711 M€, success rate 13 %, **Sept. 2020**.
- Supported the **KU Leuven Small Research Infrastructure** grant (lead researcher Prof. B. Van Hooreweder, KU Leuven), budget for a laser 3D printer PrintGenius150 AM, success rate 41.3 %, **Dec. 2020**.
- Supported the **Research Foundation-Flanders (FWO) Medium Scale Research Structure** grant **COMPLEXURF**: *Laboratory of complex surfaces and interfaces* (lead researcher Prof. D. Seveno, KU Leuven), budget for surface characterization equipment, success rate 29.2 %, **Jan. 2020**.

## ACADEMIC HONORS AND AWARDS

- Awarded the **Swiss National Science Foundation Early PostDoc Mobility Fellowship**, *Fully-printed organic electronics and sensors on flexible substrates for wearable point-of-care applications*. Budget to cover living and travel expenses as a postdoctoral researcher at Stanford University from **Oct. 2014 to Mar. 2016**.
- Awarded for obtaining the **highest GPA** (8.091 out of 10) in the major of **Electrical Engineering** at the **University of Granada** (Spain) in 2008.
- Elected by the University of California to participate in its *Education Abroad Program*.
- Honors in Final Degree Project (Semester Project at EPFL).

## EDITORIAL ACTIVITY

- **Reviewer** of the international journals: *Micromachines* (MDPI), *Sensors and Actuators A: Physical* (Elsevier), *Sensors and Actuators B: Chemical* (Elsevier), *Flexible and Printed Electronics* (IOPscience), **Small** (Wiley), *Communications Materials* (Nature Research), **Nature Communications** (Nature Research), and **Advanced Materials** (Wiley).
- **Guest editor** in the special issue *2D/3D Printed Sensors and Electronics* for the journal *Sensors* (MDPI), 2021.
- **Editor** for the journal *Sensors* (MDPI), board member for the section *Electronic Sensors*.
- **Associate editor** *Frontiers in Electronics*, specialty *Flexible Electronics*.

## PROJECT REVIEW EXPERIENCE

- Member of the **panel W&T6: Chemical Engineering, Material Sciences, Research Foundation-Flanders (FWO)**, Belgium, 2022-2024.
- Reviewer **ANR** (Agence Nationale de la Recherche), France, 2021.

**SELECTED PUBLICATIONS** (*h* index = 24, complete list in <https://scholar.google.com/citations?user=YaAZ2PIAAAAJ&hl=en>)

1. Y. Tian and **F. Molina-Lopez**, *Boosting the performance of printed thermoelectric materials by inducing morphological anisotropy*, **Nanoscale** (2021), vol. 13, 5202. DOI: 10.1039/D0NR08144B.
2. J. Liu, J. Wang, Z. Zhang, **F. Molina-Lopez**, G.-J. N. Wang, B.C. Schroeder, X. Yan, Y. Zeng, O. Zhao, H. Tran, T. Lei, Y. Lu, Y.-X. Wang, J. B.-H. Tok, R. Dauskardt, J. W. Chung, Y. Yun and Z. Bao, *Fully Stretchable Active-Matrix Organic Light-Emitting Electrochemical Cell Array*, **Nature Communications** (2020), vol. 11, 3362. DOI: 10.1038/s41467-020-17084-w.
3. U. Kraft, **F. Molina-Lopez**, D. Son, Z. Bao and B. Murmann, *Ink Development and Printing of Conducting Polymers for Intrinsically Stretchable Interconnects and Circuits*, **Advanced Electronic Materials** (2019), vol. 6, pp. 1900681. DOI: 10.1002/aelm.201900681.
4. **F. Molina-Lopez**, T. Z. Gao, U. Kraft, C. Zhu, T. Öhlund, R. Pfattner, V. R. Feig, Y. Kim, S. Wang, Y. Yun and Z. Bao, *Inkjet-Printed Stretchable and Low Voltage Synaptic Transistor Array*, **Nature Communications** (2019), vol. 10, 2676. DOI: 10.1038/s41467-019-10569-3.
5. G. Chen, R. Rastak, Y. Wang, H. Yan, V. Feig, Y. Liu, Y. Jiang, S. Chen, F. Lian, **F. Molina-Lopez**, L. Jin, K. Cui, J.W. Chung, E. Pop, C. Linder and Zhenan Bao, *Strain- and Strain-Rate-Invariant Conductance in a Stretchable and Compressible 3D Conducting Polymer Foam*, **Matter** (2019), vol. 1, pp. 1-14. DOI: 10.1016/j.matt.2019.03.011.
6. J. Xu, H.-C. Wu, C. Zhu, A. Ehrlich, L. Shaw, M. Nikolka, S. Wang, **F. Molina-Lopez**, X. Gu, S. Luo, D. Zhou, Y.-H. Kim, G.-J.N. Wang, K. Gu, V.R. Feig, S. Chen, Y. Kim, T. Katsumata, Y.-Q. Zheng, H. Yan, J.W. Chung, J. Lopez, B. Murmann and Z. Bao, *Multi-Scale Ordering in Highly Stretchable Polymer Semiconducting Films*, **Nature Materials** (2019), vol. 18, pp. 594-601. DOI: 10.1038/s41563-019-0340-5.
7. A. Gasperini, G.-J.N. Wang, **F. Molina-Lopez**, H.-C. Wu, J. Lopez, J. Xu, S. Luo, D. Zhou, G. Xue, J.B.-H. Tok and Z. Bao, *Characterization of Hydrogen Bonding Formation and Breaking in Semiconducting Polymers under Mechanical Strain*, **Macromolecules** (2019), vol. 52 (6), pp. 2476-2486. DOI: 10.1021/acs.macromol.9b00145.
8. D. Son, J. Kang, O. Vardoulis, Y. Kim, N. Matsuhisa, J.Y. Oh, J.W.F. To, J. Mun, T. Katsumata, Y. Liu, A.F. McGuire, M. Krason, **F. Molina-Lopez**, J. Ham, U. Kraft, Y. Lee, Y. Yun, J.B.-H. Tok and Z. Bao, *An integrated self-healable electronic skin system fabricated via dynamic reconstruction of a nanostructured conducting network*, **Nature Nanotechnology** (2018), vol. 13 (11), pp. 1057-1065.
9. T.Z. Gao, T. Lei, **F. Molina-Lopez** and Z. Bao, *Enhanced Process Integration and Device Performance of Carbon Nanotubes via Flocculation*, **Small Methods** (2018), vol. 2 (10), pp. 1800189.

10. G.-J.N. Wang, **F. Molina-Lopez**, H. Zhang, J. Xu, H.-C. Wu, J. Lopez, L. Shaw, J. Mun, Q. Zhang, S. Wang, A. Ehrlich and Z. Bao, *Nonhalogenated Solvent Processable and Printable High-Performance Polymer Semiconductor Enabled by Isomeric Nonconjugated Flexible Linkers*, **Macromolecules** (2018), vol. 51 (13), pp. 4976-4985.
11. **F. Molina-Lopez**, H.-C. Wu, G.-J. N. Wang, H. Yan, L. Shaw, J. Xu, M.F. Toney and Z. Bao, *Enhancing Molecular Alignment and Charge Transport of Solution-Sheared Semiconducting Polymer Films by the Electrical - Blade Effect*, **Advanced Electronic Materials** (2018), vol. 4, pp. 1800110.
12. S. Wang, J. Xu, W. Wang, G.-J.N. Wang, R. Rastak, **F. Molina-Lopez**, J.W. Chung, S. Niu, V.R. Feig, J. Lopez, T. Lei, S.-K. Kwon, Y. Kim, A.M. Foudeh, A. Ehrlich, A. Gasperini, Y. Yun, B. Murmann, J.B.-H. Tok and Z. Bao, *Skin electronics from scalable fabrication of an intrinsically stretchable transistor array*, **Nature** (2018), vol. 555 (7694), pp. 83-88.
13. X. Gu, Y. Zhou, K. Gu, T. Kurosawa, Y. Guo, Y. Li, H. Lin, B.C. Schroeder, H. Yan, **F. Molina-Lopez**, C.J. Tassone, C. Wang, S.C.B. Mannsfeld, H. Yan, D. Zhao, M.F. Toney and Z. Bao, *Roll-to-Roll Printed Large Area All-Polymer Solar Cells with 5% Efficiency Based on a Low Crystallinity Conjugated Polymer Blend*, **Advanced Energy Materials** (2017), vol. 7 (14), pp. 1602742.
14. Y. Wang, C. Zhu, R. Pfattner, H. Yan, L. Jin, S. Chen, **F. Molina-Lopez**, F. Lissel, J. Liu, N.I. Rabiah, Z. Chen, J.W. Chung, C. Linder, M.F. Toney, B. Murmann and Z. Bao, *A Highly Stretchable, Transparent and Conductive Polymer*, **Science Advances** (2017), vol. 3 (3), pp. e1602076.
15. **F. Molina-Lopez**, H. Yan, X. Gu, Y. Kim, M.F. Toney, Z. Bao, *Electric Field Tuning Molecular Packing and Electrical Properties of Solution-Shearing Coated Organic Semiconducting Thin Films*, **Advanced Functional Materials** (2017), vol. 27 (8), pp. 1605503.
16. X. Gu, H. Yan, T. Kurosawa, B.C. Schroeder, K.L. Gu, Y. Zhou, J.W.F. To, S.D. Oosterhout, V. Savikhin, **F. Molina-Lopez**, C.J. Tassone, S.C.B. Mannsfeld, C. Wang, M.F. Toney, Z. Bao, *Comparison of the Morphology Development of Polymer-Fullerene and Polymer-Polymer Solar Cells during Solution - Shearing Blade Coating*, **Advanced Energy Materials** (2016), vol. 6 (22), pp. 1601225.
17. A. Vásquez Quintero, **F. Molina-Lopez**, E.C.P. Smits, E. Danesh, J. van den Brand, K. Persaud, A. Oprea, N. Barsan, U. Weimar, N.F. de Rooij, D. Briand, *RFID Label with Printed Multisensor Platform for the Monitoring of Perishable Goods*, **Flexible and Printed Electronics** (2016), vol. 1 (2), pp. 025003.
18. **F. Molina-Lopez**, D. Briand, N.F. de Rooij, *Inkjet and Microcontact Printing of Functional Materials on Foil for the Fabrication of Pixel-Like Capacitive Vapor Microsensors*, **Organic Electronics** (2015), vol. 16, pp. 136-147.
19. **F. Molina-Lopez**, R.E. De Araujo, M. Jarrier, J. Courbat, D. Briand and N.F. de Rooij, *Study of Bending Reliability and Electrical Properties of Platinum Lines on Flexible Polyimide Substrates*, **Microelectronics Reliability**, vol. 54 (11), pp. 2542-2549.

20. E. Danesh, **F. Molina-Lopez**, M. Camara, A. Bontempi, A. Vásquez Quintero, D. Teyssieux, L. Thiery, D. Briand, N.F. de Rooij, K.C. Persaud, *Development of a New Generation of Ammonia Sensors on Printed Polymeric Hotplates*, **Analytical Chemistry** (2014), vol. 86 (18), pp. 8951-8958.
21. J.F. Salmerón, **F. Molina-Lopez**, D. Briand, J.J. Ruan, A. Rivadeneyra, M.A. Carvajal, L.F. Capitan-Vallvey, N.F. de Rooij and A.J. Palma, *Properties and Printability of Inkjet and Screen-Printed Silver Patterns for RFID Antennas*, **Journal of Electronic Materials** (2014), vol. 86 (18), pp. 604-617.
22. **F. Molina-Lopez**, D. Briand and N.F. De Rooij, *Decreasing the Size of Printed Comb Electrodes by the Introduction of a Dielectric Interlayer for Capacitive Gas Sensors on Polymeric Foil: Modeling and Fabrication*, **Sensors and Actuators B: Chemical** (2013), vol. 189, pp. 89-96.
23. **F. Molina-Lopez**, T. Kinkeldei, G. Tröster, D. Briand, N.F. de Rooij, *Theoretical and Experimental Study of the Bending Influence on the Capacitance of Interdigitated Micro-Electrodes Patterned on Flexible Substrates*, **Journal of Applied Physics** (2013), vol. 114, pp. 174907.
24. G. Mattana, T. Kinkeldei, D. Leuenberger, C. Ataman, J.J. Ruan, **F. Molina-Lopez**, A. Vásquez Quintero, G. Nisato, G. Tröster, D. Briand and N.F. de Rooij, *Woven Temperature and Humidity Sensors on Flexible Plastic Substrates for E-Textile Applications*, **IEEE Sensors Journal** (2013), vol. 13 (10), pp. 3901-3909.
25. **F. Molina-Lopez**, A. Vásquez Quintero, G. Mattana, D. Briand, N.F. de Rooij, *Large-Area Compatible Fabrication and Encapsulation of Inkjet-Printed Humidity Sensors on Flexible Foils with Integrated Thermal Compensation*, **Journal of Micromechanics and Microengineering** (2013), vol. 23, pp. 025012.
26. **F. Molina-Lopez**, D. Briand and N.F. de Rooij, *All Additive Inkjet Printed Humidity Sensors on Flexible Substrate*, **Sensors and Actuators B: Chemical** (2012), vol. 166-167, pp. 212-222.

## INVITED PRESENTATIONS

1. **F. Molina-Lopez**, *Emerging Thermoelectric Generators Based on Printed and Flexible Electronics Technology*, In Proceedings of the 19th IEEE Sensors Conference, **IEEE SENSORS 2020**, Virtual Conference, 25-28 October 2020.

## PARTICIPATION IN DOCTORAL COMMITTEES

1. Francisco J. Romero (PhD candidate), *Design, Modeling and Fabrication of Flexible Sensors for IoE Applications using Emerging Technologies*, **University of Granada** (Spain), supervisors Prof. D. P. Morales Santos and Prof. N. Rodriguez, **Jul. 2021**.
2. Fernando Moreno Cruz (PhD candidate), *Wireless power for IoT*, **University of Granada** (Spain), supervisors Prof. D. P. Morales Santos and Dr. A. Rivadeneyra, **Dec. 2020**.

3. Cecilia Teixeira da Rocha (PhD candidate), *Improved Organic Semiconductor Thin-Film Formation through the Addition of Vibrations to the Solution Shearing Method*, **Dresden University of Technology** (Germany), supervisor Prof. S. Mannsfeld, **Jun. 2020**.

### **OTHER PERSONAL SKILLS**

- Ability to adapt to **multicultural situations** acquired through working and living in many countries: Spain, Switzerland, Finland, USA and Belgium.
- Languages: **Spanish** (Native), **English** (Fluent), **French** (Fluent), **Dutch** (Intermediate, B1), **Mandarin** (Beginner).
- Extracurricular activities: I have studied classical music for ten years, obtaining the certificate for intermediate level in piano from the Superior Conservatory of Music Victoria Eugenia of Granada (Spain).